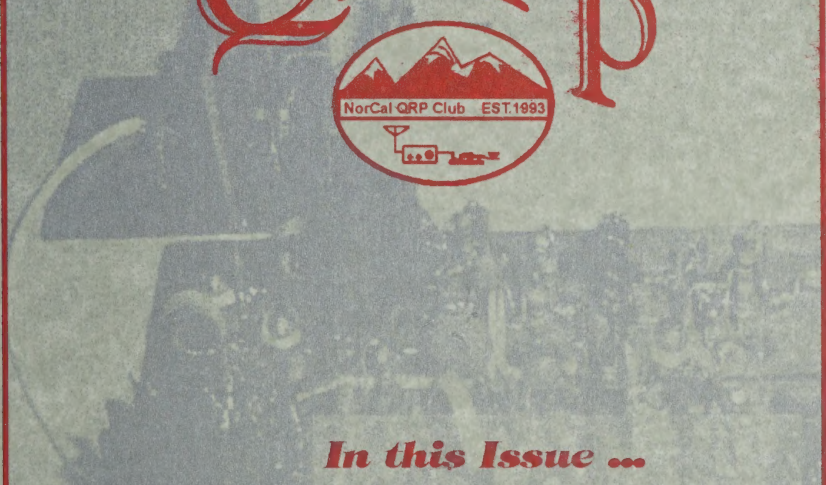
Vol. VII, Number 4 Winter 1999

QRPp

NorCal QRP Club EST.1993



Special 6 Meter Issue

Plus the 2N2/6!

In this Issue ...

Journal of the Northern California QRP Club

This issue of QRPp *is devoted largely to the 6-meter ham band. Many QRPers have learned to enjoy 6M, while others seem to know little about this unique band. For those of you, like me, who are fairly ignorant about 6M, the following article, by Dave Finley, offers an excellent introduction to "the magic band."*

Dave Finley, N1IRZ, is author of "Morse Code: Breaking the Barrier," *published by MFJ Enterprises. He is a past president of the Socorro (NM) Amateur Radio Association and a frequent lecturer on radio topics.*

--NA5N

Six Meters: An Introduction

By Dave Finley, N1IRZ
Socorro, New Mexico

Six Meters (50-54 MHz) is known as "The Magic Band" to many of its fans, but the best description I ever heard came from a ham I worked during a frantic summer Sporadic-E opening: "This is a great band if you like having Mother Nature pull your chain."

On six meters, you can do almost anything that can be done on an HF band. Hams have earned WAS, WAC and DXCC on six. Six meters can sound like a contest weekend on 20, filled with signals and pileups galore. What makes it so different from the HF bands is that you never know when this excitement will come. That ear-blasting cacophony of signals can change into a completely dead band in only a few minutes. Or when this excitement will come. That ear-blasting cacophony of signals can change into a completely dead band in only a few minutes. Or vice-versa!

Six meters offers nearly every kind of propagation known. At the peak of a sunspot cycle, when the solar flux rises to between 150 and 200, the F-layer skip familiar to HF operators can provide worldwide contacts on six. If the flux goes significantly above 200, DX work on six can even get fairly reliable. Propagation modes more familiar to VHF operators, such as sporadic-E, auroral, meteor-scatter, transequatorial and moonbounce, all have been used on six meters.

Sporadic-E is the most common workhorse for six-meter operators. Peaking around the solstices (June and December), this mode of propagation can provide contacts over a few hundred miles or a couple of thousand miles or more with a "double-hop." It comes back every season, even during the sunspot minimum. Sporadic-E was essentially discovered by hams during the 1930s, when the old 5-meter band (56 MHz) produced contacts covering "impossible" distances. The "E-skip, season" runs from May to July, with another, shorter, peak in December and early January, but this propagation mode can appear at any time. A sproadic-E opening typically lasts for a few hours. For a thorough discussion of Sporadic-E, see the article by Emil Pocock, W3EP, in the April 1988 issue of QST.

Stations for Six

Today, it's easier than ever to get on six meters. Many of the newer HF rigs come

with six-meter capability built in. There also are *transverters*, such as the ones from Ten-Tec and the 2N2/6 construction project later in this issue, that will put your HF rig on six, and single-band rigs such as MFJ's "Adventure Radio." If you're interested in DX, avoid the FM-only six-meter rigs and get one capable of CW and SSB operation. You don't need a lot of power. When six is open, it's open!

Antennas for this band are readily available commercially, but also easy to homebrew. A dipole for six meters is only a bit over nine feet long, and even a wire dipole, in a good location, will perform well. At this length, it also is easy to make a rotatable dipole from aluminum tubing. A three-element Yagi will perform admirably, and makes a nice weekend construction project. Ground-plane and J-Pole antennas also work fine for six meters.

While antenna polarization makes little difference for DX work, it is important if you also want to work other six-meter operators within ground-wave range. Most operators with Yagis or rotatable dipoles use horizontal polarization, so if you rely on a vertical ground-plane or J-Pole, you may miss out on local and regional six-meter nets, which can provide a nice way of keeping up with weak-signal VHF happenings. One way to get both polarizations in one antenna would be to build an "L" antenna for six, adapting the 10-meter design of W4RNL presented in the December 1999 QST, page 52.

Again, you don't need an elaborate station to get good results on six meters. During one opening, I exchanged honest S-9-plus signal reports with a station several hundred miles away, then he asked about my station. When I said, "ten watts and a ground-plane antenna," he laughed. His station: 1,500 watts and an array of four, 11-element Yagis. And the same signal report on both ends! (This guy uses his top-of-the-line station for six-meter moonbounce work.)

Getting on the air

Six-meter operators do a lot of waiting, because of the unpredictable nature of the band. To help show when the band is open, six-meter fans around the world have put a fairly extensive suite of ***6M beacons*** on the air. In the U.S., beacons occupy the region between 50.060 and 50.080 MHz. In other countries, beacons are spread more widely throughout the band. For lists of beacons, their frequencies, locations and other details, look at the following Web sites, which are updated regularly:

http://www.keele.ac.uk/depts/por/50.htm

Http://user.super.net.uk/~equinox/50.html

http://www.qsl.net/oz6om/bcn1099.html

It's a good idea to pick a few beacons in different directions from your QTH and check their frequencies regularly. During an opening, go through the beacon subband and note which ones you're receiving, then watch for them later.

Unlike the HF bands, six meters is much more rigidly structured in terms of what frequencies are used for what purposes. Ironically, six meters, available to all no-code Techs, is one of only two ham bands (2 meters is the other) with a CW-only subband which excludes all data transmissions. That CW-only subband runs from 50.0 to 50.1 MHz. Almost all weak-signal activity on six occurs between 50.1 and 50.4 MHz.

Calling frequencies are used extensively. From 50.100 to 50.125 is a "DX Window," in which domestic QSOs are discouraged. The DX calling frequency is 50.110. The

traditional domestic calling frequency is 50.125. However, there has been a movement recently to extend the DX window to 50.130 and make 50.200 the new domestic calling frequency. This movement has been precipitated by the extension of six-meter privileges to hams in new countries around the world, and the associated increase in the number of DX stations on the air. Such band plans are, of course, voluntary, but are observed widely by the six-meter community.

The recommended CW calling frequency is 50.090, but you will often hear CW CQs on 50.125, too. Under the old band plan, you would hear many stations on 50.125 as the band opened up, then, as more stations discovered the opening, activity would spread upward in frequency, reaching 50.3 or 50.4 during a good opening. It seems likely that, while the new, expanded DX window probably will catch on, many operators will take some time to "let go" of the old, familiar 50.125. I would recommend monitoring both 50.125 and 50.200, as well as 50.090, during an opening. If the opening seems real good, start checking 50.110 for DX stations, too.

Most domestic weak-signal contacts on six are SSB, but in recent years, there has been an increase in CW activity. As mentioned above, the CW activity often is intermingled freely among the SSB signals. It would be nice to see more CW activity down around 50.090, and use the CW-exclusive subband to better advantage.

Grid Squares

The first thing you will be asked when you make a contact on six is, "what's your grid square?" While still little known among HF operators, the Maidenhead grid-square system, formalized at a VHF meeting in Britain in 1980 and adopted world-wide by the International Amateur Radio Union in 1985, is almost universally used as a locator system by VHF, UHF and microwave operators. The Maidenhead system divides the world into 32,400 squares, each 2 degrees of longitude by 1 degree of latitude. There are larger "fields" of 100 locator squares each, and each square is divided into smaller "subsquares." For most purposes, knowing your 2 degree by 1 degree square is sufficient.

VHF operators collect grid squares like HF operators collect countries. Many are working toward the ARRL's VHF-UHF Century Club (VUCC) award, which requires confirmed contacts with 100 grid squares. During VHF contests, some enthusiasts go on "Grid expeditions," to put rare grid squares on the air, while others become "rovers" to operate from several grids during the contest. Just as states or countries serve as multipliers for HF-contest scores, grid squares are the typical multipliers for VHF-contest scores.

You can find a ***grid-square map of the U.S.*** at:

www.amt.org/Multimedia/images/grid-na.gif

or plug your latitude and longitude into AMSAT's grid-square calculator at:

www.amsat.org/amsat/toys/gridconv.html

If you work much on six meters at all, you'll probably want to add your grid square to the information on your QSL card.

More information on the Web

Many hams have become rather fanatical about six meters, and there is a wealth of information about this band on the Web. To learn more, you can start at the site of the ***Six Meter International Radio Klub (SMIRK)***, at:

Http://www.smirk.org

You can earn a lifetime membership in SMIRK by working six members on six meters and collecting their SMIRK membership numbers. SMIRK sponsors contests, publishes a newsletter and meets annually.

Another good Web site is provided by the ***UK Six Metre Group***, at:

http://www.uksmg.org/

Six meters can provide you with a lot of excitement and new operating challenges. In addition to offering new awards and contests, this band can expand your experience with different propagation modes.

Finally, in my opinion, six meters serves a valuable function for the health of Amateur Radio. All licensed hams, except for Novices, can use six meters. In recent years, no-code Technicians have discovered this band in increasing numbers. When someone whose only experience with Amateur Radio has been local operation on 2-meter repeaters makes a six-meter contact with another ham more than 1,000 miles away, that can be a dramatic revelation that opens up a whole new world to them.

In many cases, such a revelation spurs that ham to upgrade their license and join us on the HF bands. When that happens, we have, in all likelihood, gained a lifelong radio devotee who otherwise might have dropped from our ranks from boredom. By showing such hams the wider world of our hobby, six meters earns its appellation of "The Magic Band."

Special Construction Feature:
Step-by-Step "Build it from scratch" 6M QRP Transverter

NorCal is pleased to present another excellent construction project -- the 2N2/6, a 6M-to-40M transverter, designed by Jim Kortge, K8IQY. Jim, who also designed the 2N2/40, again demonstrates good engineering and excellent performance can be achieved with commonly available parts. Jim's excellent article presentation, with the assembly drawings by Paul Harden, NA5N, offers another "step-by-step, build-it-from-scratch" project just about anyone can build.

A 40-Meter to 6-Meter, 2N2222 Based, CW Transverter

By Jim Kortge, K8IQY
P.O. Box 108
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The objectives of this project were to illustrate how transverters can be used to extend operation of a monoband transceiver to another band, to provide a low cost way of extending most 40-meter CW QRP rigs to 6-meters, and to test the practical operating limits of the common 2N2222 transistor. Most of the circuitry presented was modeled before being built using Electronic Workbench, a SPICE based commercial modeling system. Construction is based on the "Manhattan style", a method popularized by the author's previous work. An alignment generator's design and construction are also included. This transverter is a follow-on to the author's previously published design for a 2N2222 based 40-meter transceiver.

2N2/6 Transverter Specifications

Receive

Input: 50 Mhz
Output: 7 MHz
Front End: ~500 KHz bandwidth
Sensitivity: -120 dBm (0.25uv)
R. F. Amplifier: +10 dB
Diode single balanced mixer

Transmit

Input: 7 MHz
Input Power: ~2 watts
Output: 50 MHz
Output Power: 2 watts (3-2N2222A)
Spurious Outputs: <-50dBc
Good r.f. stability
Solid state T/R switching

Overall

10-2N2222 transistors; 1-2N2907 transistor
Circuits modeled with Electronics Workbench
Manhattan style construction; 4X5 inch footprint

Background

Transverters are a practical means of extending the operation of an existing, monoband transceiver to another frequency band. They work by linearly transforming the input signal of the exciter or driving transceiver to a higher, or lower band. Most of the input power is absorbed in an input attenuator, as the transformation is done at low power levels. Following the transformation, filtering, amplification and more filtering are applied to provide an output signal on the new frequency band.

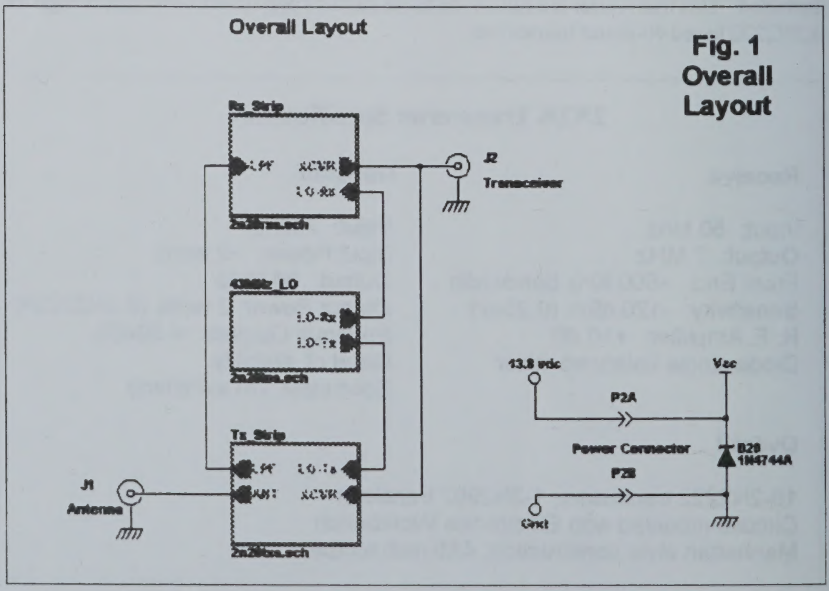
On the receiving side, an equivalent process is used. An incoming signal is usually amplified, linearly transformed to the input frequency of the transceiver, filtered, and passed on for further processing. The transceiver is used to provide intermediate frequency amplification, detection, and audio amplification.

Since the driving transceiver often only has a single antenna connector, used for both receiving and transmitting, some means must be incorporated into the design to direct the incoming high level r.f. to the transmit section of the transverter, and send the low level signals from the antenna during receive, back to the transceiver. This is usually done with a system of relays, or solid-state switches.

While this transverter design provides 6-meter operation for a 40-meter transceiver, other band possibilities are possible. As an example, the design could be scaled to provide 12 or 17-meter operation from 40-meters, or possibly from 20-meters. Many other combinations are viable as long as the band of interest is not related to low order harmonics of the input.

2N2/6 Overview

Figure 1 shows a block diagram of the 2N2/6 transverter. It has three major sections, a receive strip, a transmit strip, and a common local oscillator. We'll look at each section in detail a bit later.



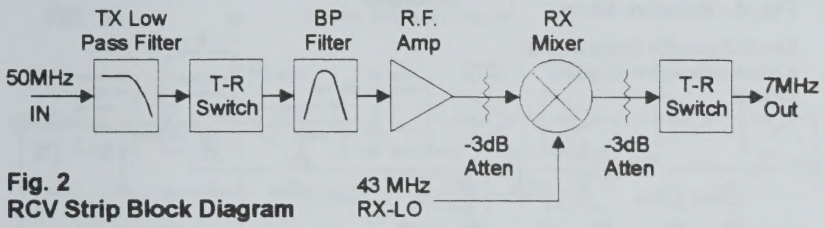


Fig. 2
RCV Strip Block Diagram

The receive strip takes incoming 50 MHz signals arriving from the antenna (connector J1), mixes them with the 43 MHz local oscillator signal, filters them, and makes them available on the transceiver connector, J2. These signals have been translated to 7 MHz, so they can be received by the 40-meter transceiver. As an example, an incoming signal at 50.100 MHz is translated to a frequency of 7.100 MHz.

On the transmit side, 7 MHz output from a 40 meter transceiver is sent to connector J2, significantly reduced in power by an attenuator, mixed with the 43 MHz local oscillator, filtered, amplified, filtered again, and sent to antenna connector J1. The output signals are at 50 MHz, and linearly track the tuning of the 40-meter transceiver providing the driving power. As an example, a 40-meter signal on 7.040 MHz becomes a signal at 50.040 MHz.

The local oscillator is common to the receive and transmit strips, and provides the approximate +10 dBm power level needed by the respective single balanced mixers. A common 14.318 MHz computer crystal is used in a frequency tripler circuit to generate the needed 43 MHz mixer drive.

Receive Strip Details

Figure 2 is a more detailed block diagram of the receive strip, showing all of the important elements.I ncoming 50 MHz signals are first routed through the transmit low pass filter. This attenuates all signals that are above the 6-meter band, which might mix with a harmonic of the 43 MHz local oscillator to produce a signal in the received 40-meter band. The signal then passes through the first of three transmit/receive (T/R) switches. This T/R switch isolates the receive strip from the transmit signal, on the antenna or input side. Next, the signal is passed through a lightly coupled, two resonator band pass filter, which attenuates out-of-band signals, both above and below 6 meters. Its frequency response is shown in **figure 3.**

The primary purpose of this filter is to restrict the band of signals passed to the r.f. amplifier. It also minimizes the signals that could mix with the fundamental or harmonics of the local oscillator and produce a signal in the received 40-meter band. Signals are then amplified by a common base r.f.

Fig. 3

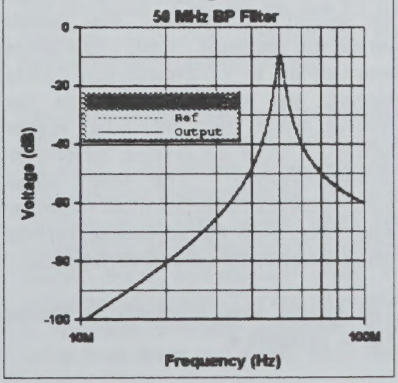
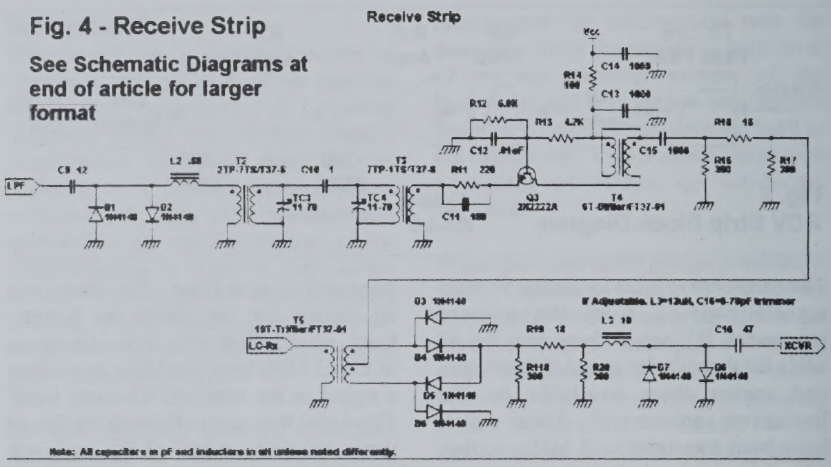


Fig. 4 - Receive Strip

See Schematic Diagrams at end of article for larger format



amplifier, with an untuned output. Gain of this amplifier is approximately +10 dB. An amplifier with a tuned output was attempted, but could not be made stable using the 2N2222 transistor. Considering the 2N2222A has a published Ft of 300 MHz, it is somewhat remarkable that +10dB of gain can be achieved at 50 MHz. From the r.f. amplifier, signals pass through a 50 ohm, 3 dB attenuator, and on to the diode, single balanced mixer. This mixer uses common 1N4148 diodes that are matched for forward resistance. Local oscillator drive to the mixer is at approximately +10 dBm. Mixer output signal is then taken through another 50 ohm, 3 dB attenuator, to keep the load on the mixer somewhat constant. The signal then passes through the second T/R switch. This switch serves two purposes. First, it is a series tuned circuit, so it attenuates non-7 MHz signals, and second, it protects the receive mixer from incoming, higher power r.f. from the driving transceiver during transmit. The series tuned components can be either fixed values, or adjustable, with the adjustable version being preferred for optimal performance.

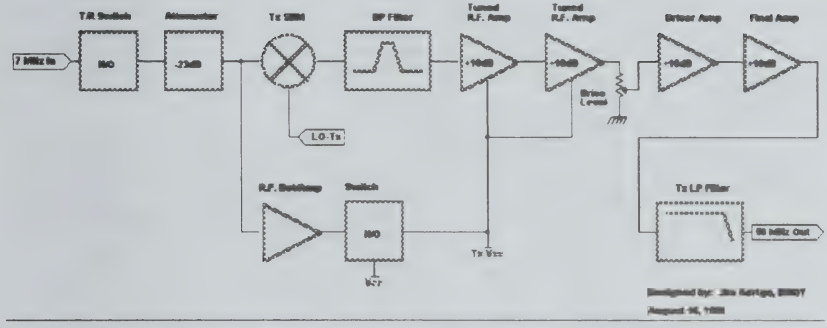
The receive strip schematic is shown above as **figure 4.**

Transmit Strip

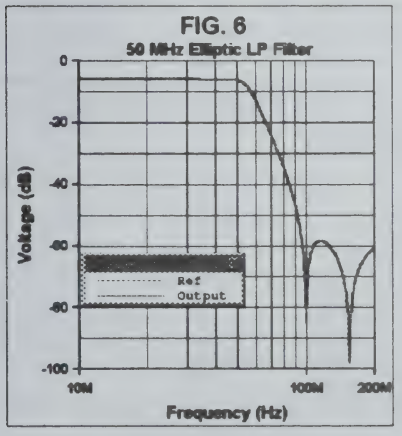
Figure 5 (see page 11) is a detailed block diagram of the transmit strip.

Incoming r.f. from the driving transceiver is passed through the third of the T/R switches. This switch is comprised of a pair of back-to-back 1N4007 rectifiers. It acts as an isolator at low r.f. levels so the transmit input attenuator does not load down the transceiver port on receive. The signal is then attenuated by -23dB by the input attenuator, and drives the RF port of the transmit single balanced diode mixer at about +10dBm. This mixer is a duplicate of that used in the receive strip. Also coming in to the mixer on the LO port is the 43 MHz local oscillator. Coming out of the mixer, the signals are routed through a narrow band pass filter, a duplicate of the input filter on the receive side that is ahead of the r.f. amplifier. This filter greatly attenuates the non-50 MHz signal components, including the 43 MHz local oscillator component. At this point, the 40-meter input signal is now converted to 6-meters, and reasonably well filtered. Two class A amplifiers with tuned outputs are next used to amplify the 6-meter signal up to about +13 dBm, or 20 milliwatts.

FIG. 5 Transmit Strip Block Diagram



The next amplifier in the chain is run at class B, for higher efficiency, and has an untuned output. It can provide up to about +23 dBm of output, or 200 milliwatts. This stage is the driver for the finals. The final amplifier uses 3-2N2222A transistors in parallel, just like the 2N2/40 rig. Using 3 transistors, one can achieve a safe output power of 2 watts. Following the final amplifier is an elliptic low pass output filter, with notches set for 100 and 150 MHz, the 2nd and 3rd harmonics of the 6-meter signal. This type of filter is required to meet the stringent requirements imposed by the FCC for emissions above 30 MHz. For a transmitter at 50 MHz, with a power output of 2 watts, all spurious components must be at least -50 dB below the reference carrier. **Figure 6** shows the frequency response of this filter. The notches just described are clearly visible.



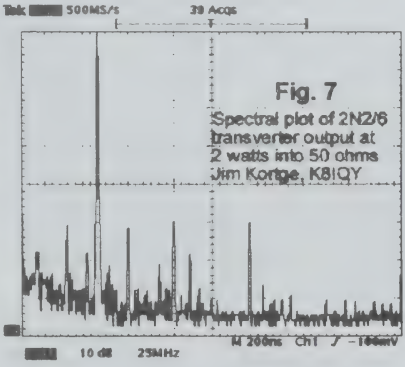
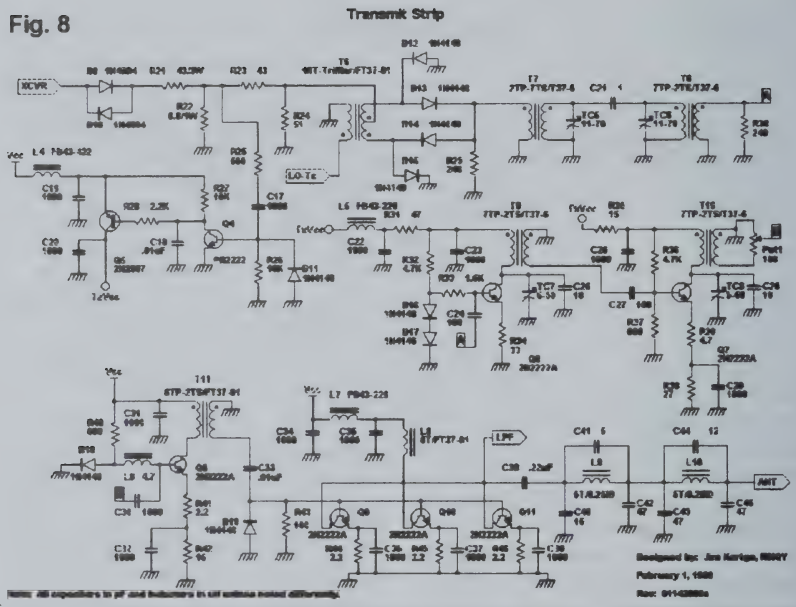


Fig. 7
Spectral plot of 2N2/6 transverter output at 2 watts into 50 ohms
Jim Kortge, K8IQY

Figure 7 is a spectral plot of the transverter showing the fundamental, and the 2nd and 3rd harmonic components just discussed. One can see that the rig complies with FCC regulations, but there is virtually no error margin.

One of the unique features of the transmit strip is the use of r.f. sensed switching of the class A amplifiers during transmit. This was done for two reasons. The most obvious is to save power when not transmitting, as the two class A amplifier stages draw collectively over 40 milliamps of current. The less obvious is to eliminate internally generated VHF noise from these two stages when they

Fig. 8



are not being used for transmitting purposes. If these two stages are running during receive, incoming low level signals (those below about 25 microvolts) are completely masked by internally generated noise by the amplifier pair. **Figure 8** is the schematic diagram of the transmit strip. One can plainly see it is much more complicated than the receive strip, which is typical of most transverters.

Local Oscillator

A block diagram of the local oscillator is shown in **Figure 9**. The local oscillator section consists of a crystal controlled Colpitts oscillator with the output tuned to the 3rd harmonic of the 14.318 MHz, computer grade crystal. Series capacitance is employed to raise the fundamental of the crystal to 14.333 MHz, which triples to 43 MHz, the local oscillator frequency used in the transverter. The tuned output uses a capacitive divider arrangement to lower the output impedance driving the buffer amplifier. This approach helps decouple the oscillator stage from the buffer so that oscillator frequency pulling is minimized. It is also lightly coupled to the buffer stage to further improve

Fig. 9

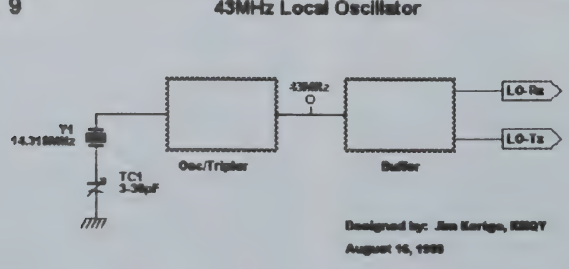
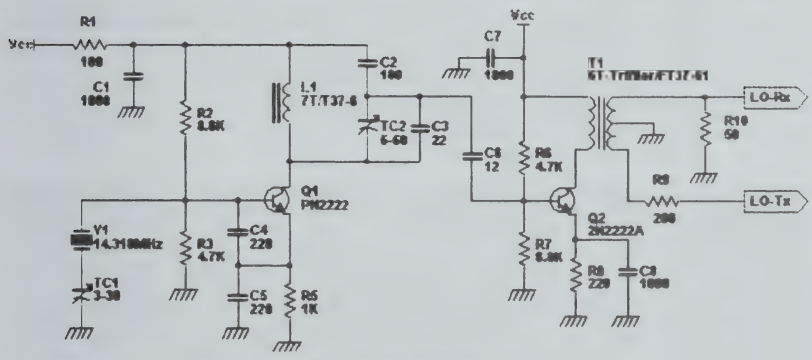


Fig. 10 43MHz Local Oscillator



Note: All capacitors in pF and inductors in uH unless noted differently.

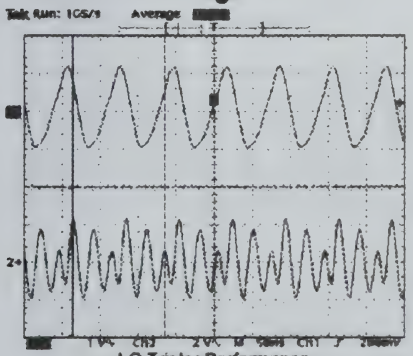
isolation. Output drive for receive and transmit single balanced mixers is taken from opposite phases of the untuned output transformer. The drive level on each side is about +10 dBm

Figure 10 shows the schematic diagram of the Local Oscillator section. A few variants in both oscillator design and layout were tried, but the current configuration seems to work the best overall. As an aside, it does have an interesting anomaly, not completely understood by the author. As shown in the output waveform, **figure 11**, there is a decrease in harmonic energy as the harmonics increase.

The waveform is not uniform at the 43 MHz output frequency. Interestingly, the EWB model of the same circuit shows the same anomaly. This is shown in **figure 12**. I suspect it has to do with circuit losses that become larger with increasing frequency. However, it may simply be loss in the oscillator output inductor itself, since the circuit is only getting a new "packet" of energy every third cycle of the output. This phenomenon may be quite typical of an oscillator with a third harmonic tuned output, and only represents my lack of experience with this type of circuit.

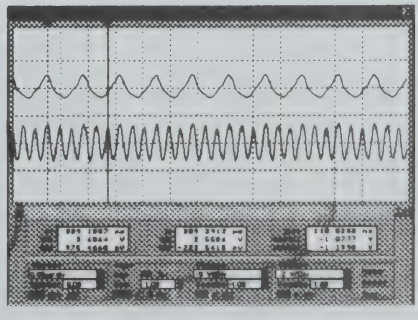
This completes the technical description of the system. We'll now turn our attention to the construction aspects of

Fig. 11



LO Tripler Performance

Fig. 12



Manhattan Style Construction Overview

Manhattan style construction gets its name from the fact that Manhattan is an island, and the technique makes use of small circular or rectangular pads (islands) affixed to the PC board substrate with an adhesive, as the connection points for components. In addition to the pad "islands", the name also suggests the "look of a city", with various sized and oriented components appearing as a city in miniature when viewed from a few feet away. **Figure 13** is a photograph of the transceiver board to illustrate this effect.

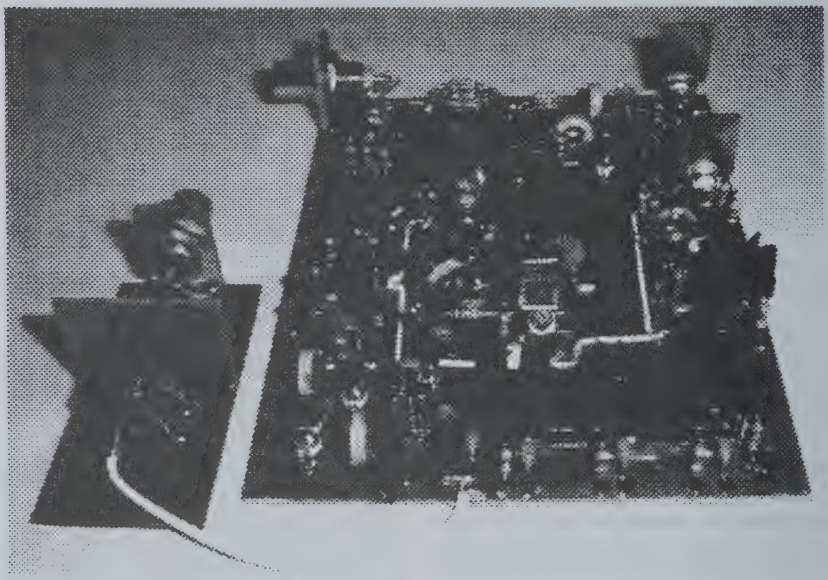


Fig. 13 - Photograph of the 2N2/6, built "Manhattan Style" by K8IQY

Manhattan Style Construction Overview

There are at least three very significant advantages to building with this technique. The first, and probably most important, is that building r.f. circuits over a solid ground promotes very quiet receive conditions as circulating r.f. currents are virtually non-existent. This effect also promotes stability in both receiving and transmitting circuits.

The second advantage is that the small pads act as a tiny bypass capacitor at each circuit node, helping to reduce or eliminate VHF and UHF parasitic oscillations. A 3/32 X 1/4 inch pad produced by an ADEL nibbling tool has a pad capacitance of nominally 0.5 pF, when bonded to a piece of PC board material. In like manner, a 5/32 inch diameter round pad has a capacitance of about 0.4 pF. Neither pad's reactance is significant (25-50K ohms) at HF or low VHF frequencies, but provides significant reactance (500 ohms) at 500 MHz, and above.

Advantage three relates to the ease of changing what has been built if it doesn't work. The parts can be easily removed and reused, as can the pads, to rebuild a different piece of circuitry. In addition, more circuitry can be added without having to completely redo a board.

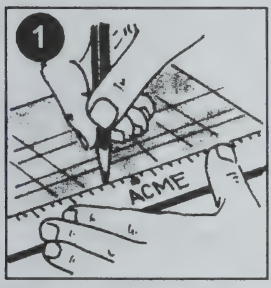
One can use the method to build a circuit on a substrate by generally following the layout show in the schematic. As a result, building is quite fast, and with practice, part orientation and location become very intuitive.

When using the method on a new circuit, trying to estimate the size of the finished board, and adding at least 25% to each dimension is a worthwhile endeavor. Any unused substrate can be removed later, when all of the circuitry is built. In addition, marking off sections of the substrate where various portions of the circuit will be built can be a great help in overall organization and layout.

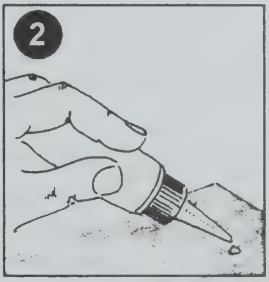
The basic steps for building with the "Manhattan" technique are illustrated below.

The "Pad" or "Manhattan" Technique

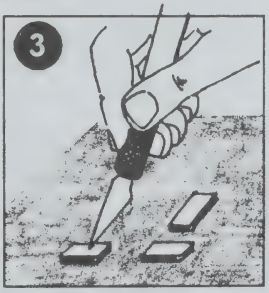
Pads are made from small pieces of copper clad. They can be made by cutting out of a piece of copper clad (single sided OK) with a nibbling tool, round punch (such as from Harbor Freight) or other means. The "main board substrate" is a solid piece of copper clad board, double sided is preferred.



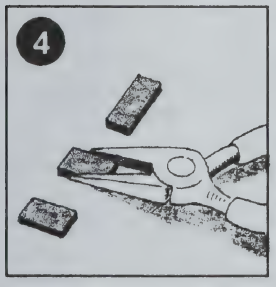
Draw guidelines and the footprints of each section with pencil on the copper clad board. Planning ahead is important!



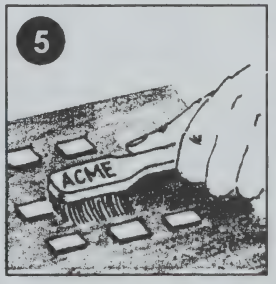
Apply a drop of *Super Glue* or other adhesive to the main board where pad is to be placed. (Glue 1 or 2 at a time!)



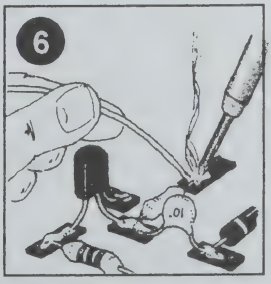
Drop pads in place over the glue drops and position with exacto knife or other sharp object.



Super glue affixes the pads quite well! To remove or reposition a pad, snap-off by a twist with needle-nose pliers.



Boards and pads can be cleaned with a brush and alcohol, mild solvent or water. Excess glue may have to be scrapped off.



Solder the components to the proper pads by following the detailed assembly drawings that follow.

The 2N2/6, as illustrated herein, was built in a "clam-shell" type metal enclosure about 4.5x5.5 in. square. The main substrate board was mounted using threaded standoffs in the main portion of the enclosure. The smaller output lowpass filter board was mounted on the inside of the rear panel. Also on the rear panel are the two BNC's, DC power connector and fuse holder. There are no controls on the front panel.

Jim's 2N2/6 is illustrated below. Of course you can follow this construction exactly, or modify to suit your own tastes.

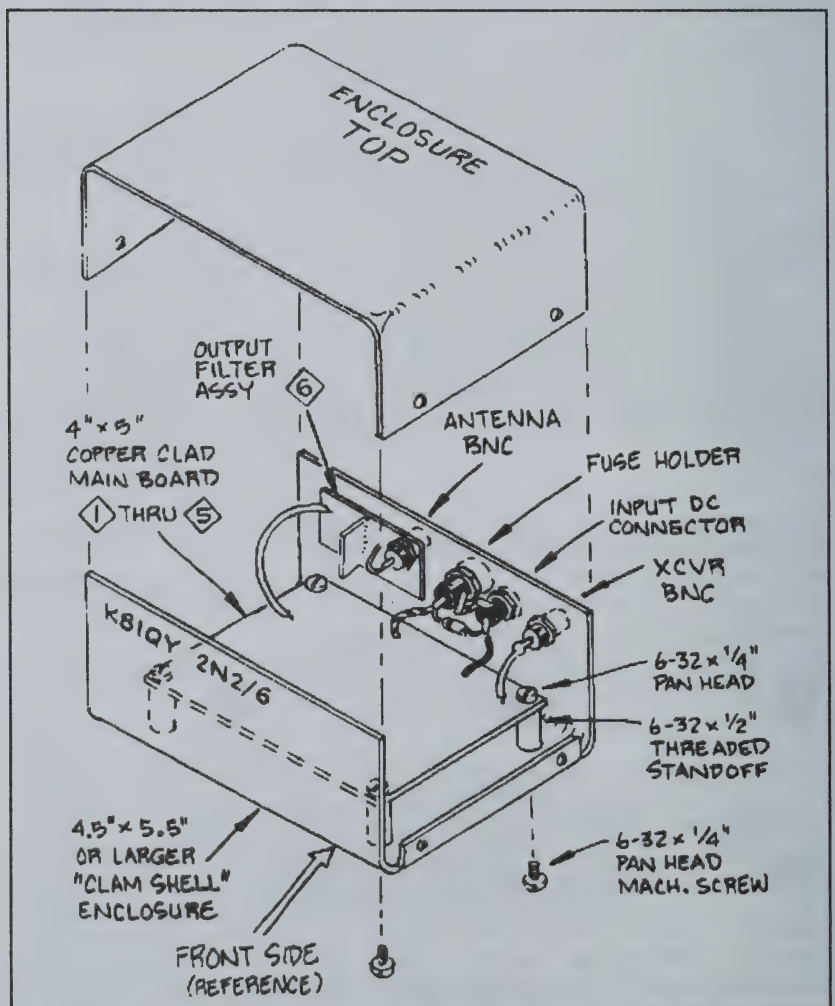
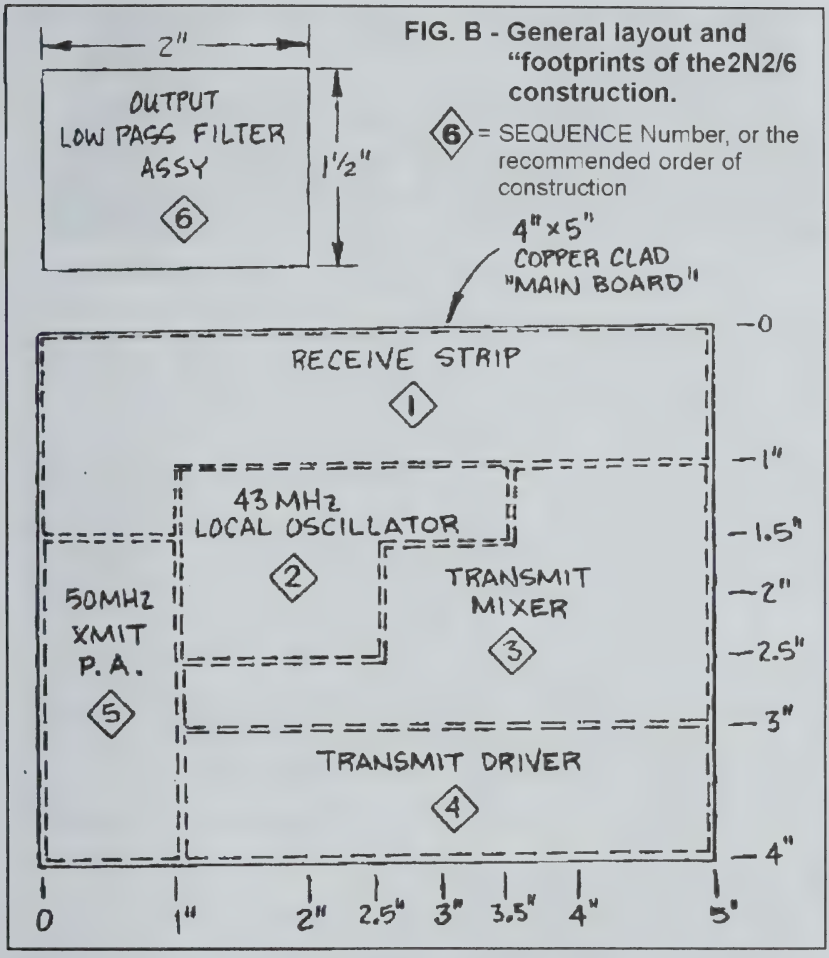


FIG. A - Exploded view, general parts layout and identification of the 2N2/6 Transverter.



1 RECEIVER STRIP CONSTRUCTION

Schematic	Assembly Dwg.
SHT. 1	**SEQ. #1**

For this project, construction begins across the long dimension of the substrate with the receive strip. The area utilized on the prototype was 1 X 5 inches, and is shown as SEQ. #1 in **figure A** above, the assembly illustrated in drawing **SEQ. #1**, and a photograph of the receive strip in **figure 14.** Moving from right to left (when viewed from the back-panel end of the board), one can see the double tuned front-end filter, then a tuned output r.f. amplifier (this was an early version using a plastic PN2222), attenuator, the single balanced mixer transformer and diodes, another attenuator, and the output T/R switch. The receive input T/R switch wasn't added until the transmit section was finished. As a point of reference, this assembly step is the only one which will show the substrate in this "inverted" orientation. All other figures will show the substrate rotated 180 degrees, that is, as viewed from the front panel.

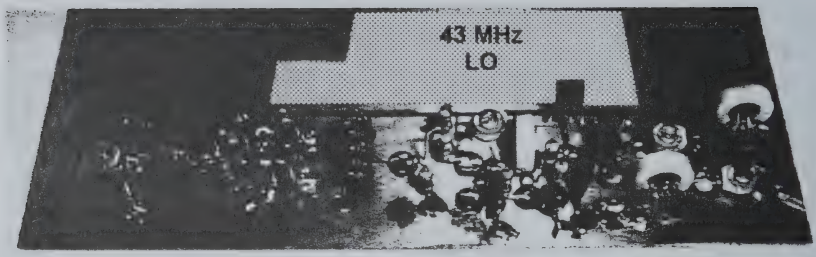


Fig. 14 - Photograph of the finished Receiver Strip construction
(Shaded area shows where 43MHz LO will be built)

The windings on transformers T1 and T2 are close wound as can be seen. This isn't the usual approach for winding toroids, as it adds a small amount of winding capacitance relative to winding over approximately 300 degrees, which is more common. However, this method provides greater consistency in the final inductance achieved, and is preferred if one does not have a means of measuring the wound toroids inductance.

It was during a preliminary test of the circuitry at this point in the construction that it became obvious the r.f. amplifier had to be redesigned, as it was most unstable! The tuned output version was replaced with the untuned circuit shown in the schematic, and good stability was achieved. The untuned version also saved one trimmer capacitor.

When this part of the transverter was done, it was tested by injecting a 43 MHz signal into the LO port of the receive SBM, while using a Yaesu FT-990 as the downstream transceiver. While no signals were heard on 6-meters, 49 MHz cordless telephone signals could be heard, especially those from a neighbor approximately ½ mile away. Of course, you can do this easier once you build the on-board 43MHz LO next. The **receiver alignment** procedures follows the 43 MHz LO construction.

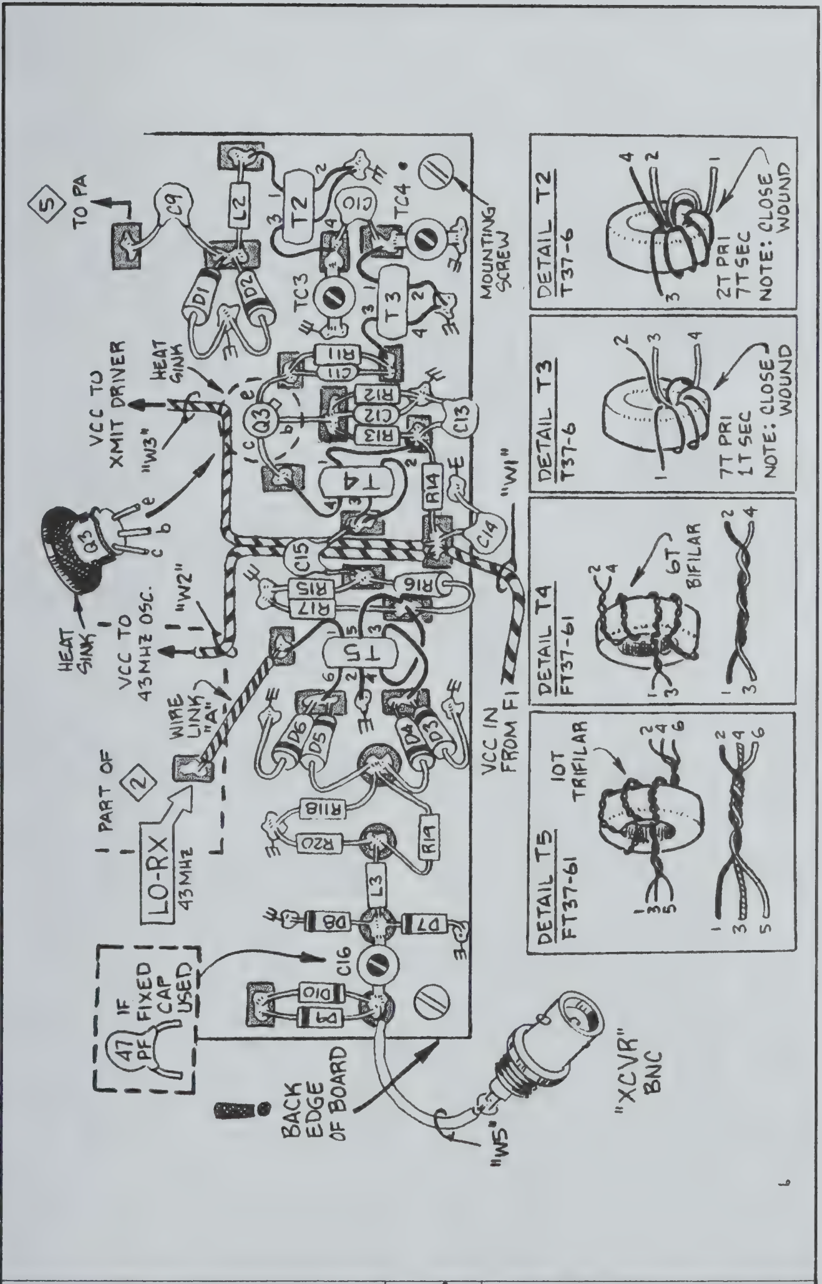
2 43 MHz LOCAL OSCILLATOR (LO)

Schematic	Assembly Dwg.
SHT. 2	**SEQ. #2**

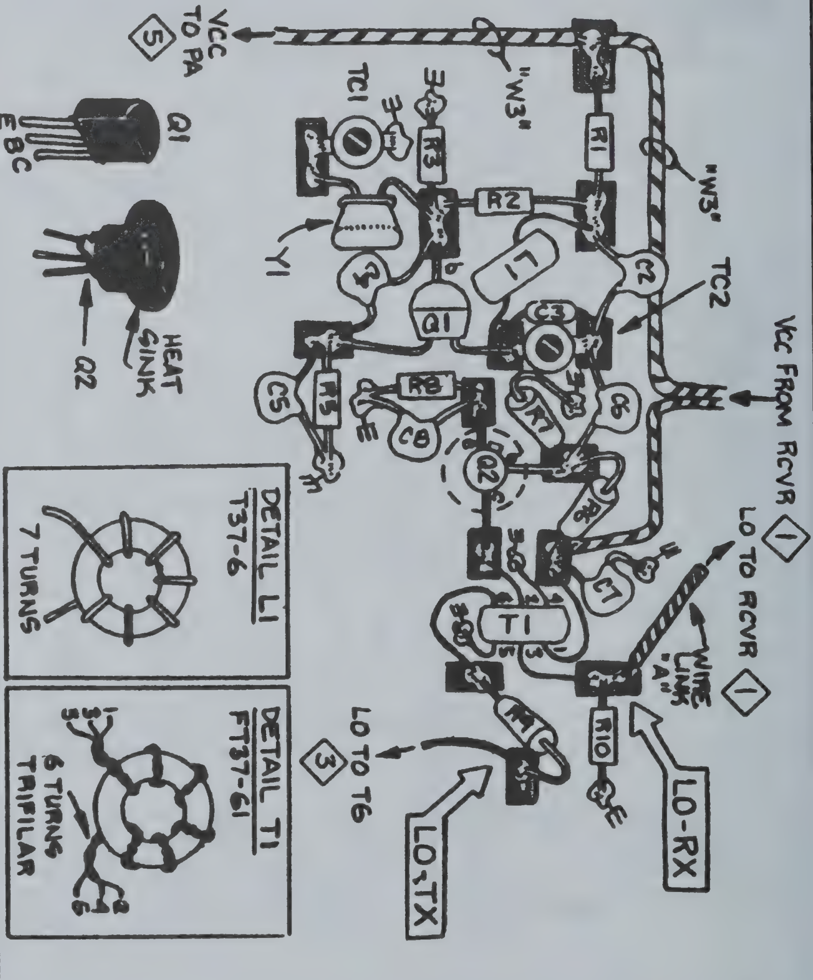
The 43 MHz local oscillator (LO) circuitry was then added below the receive strip. (Here is where the board reorientation takes place.) **Figure B** and the shaded area in **figure 14** shows the 43 MHz LO "footprint."

The layout of this stage was planned so that its output would be close to the LO port of the receive SBM. The oscillator itself was built to the left and the buffer to the right, with the untuned output transformer of the buffer (T1) below the receive single balanced mixer transformer (T5). The *wire link* shown in both SEQ #1 and SEQ #2 drawings is the LO link (signal LO-RX) between T1 and T5.

The footprint for the 43 MHz LO is slightly irregular in shape. Pencil out the area on the main substrate using the dimensions from **figure B** (pg. 17) for the oscillator, and the rest of the 2N2/6 will fall right into place..



SECTION **RECEIVE STRIP**	SEQ 1	**2N2/6 TRANSVERTER** Designed by Jim Kortge, K8IQY Drawn by Paul Harden, NA5N



SECTION	SEQ	2N2/6 TRANSVERTER
45 MHz L.O.	2	Designed by Jim Kortge, K8IQY Drawn by Paul Harden, NA5N

Upon completion of the 43 MHz oscillator, you can now align the 2N2/6 receiver portion.

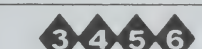
Receive Strip Alignment

At this point, a working receive converter exists, and can be tested by applying power and adjusting trimmer TC1 for 43 MHz output from the oscillator. Adjusting TC2 for maximum signal out of the buffer, measured on either of the transformer T1 outputs completes the local oscillator setup. The next step is to inject a 50.000 MHz signal into the antenna input (J1), and adjust receive strip trimmers TC3 and TC4 for maximum output, while listening on a transceiver attached to the transceiver output (J2), and tuned to 7.000 MHz. There is some interaction between these two trimmers, so adjustments will need to be repeated a few times to get everything peaked properly. If the transverter is built using a trimmer for C16, this trimmer should now also be peaked. Assuming everything adjusts and peaks as described, the receive strip should be capable of hearing 6 meter signals above about 0.25 microvolts, which is an MDS of about -119 dBm.

If a suitable signal generator is not available for doing the tune-up, this would be a good point in the project build to construct the alignment generator shown in the appendix. This generator can be used for the receive strip alignment, as well as the transmit strip alignment.

If this is your first project using Manhattan style construction, you might prefer to build the alignment generator first, to see how the method works and gain some confidence before starting the transverter itself. The alignment generator is at the end of the article. Or, build the Output Filter first, SEQ #6.

TRANSMIT STRIP CONSTRUCTION



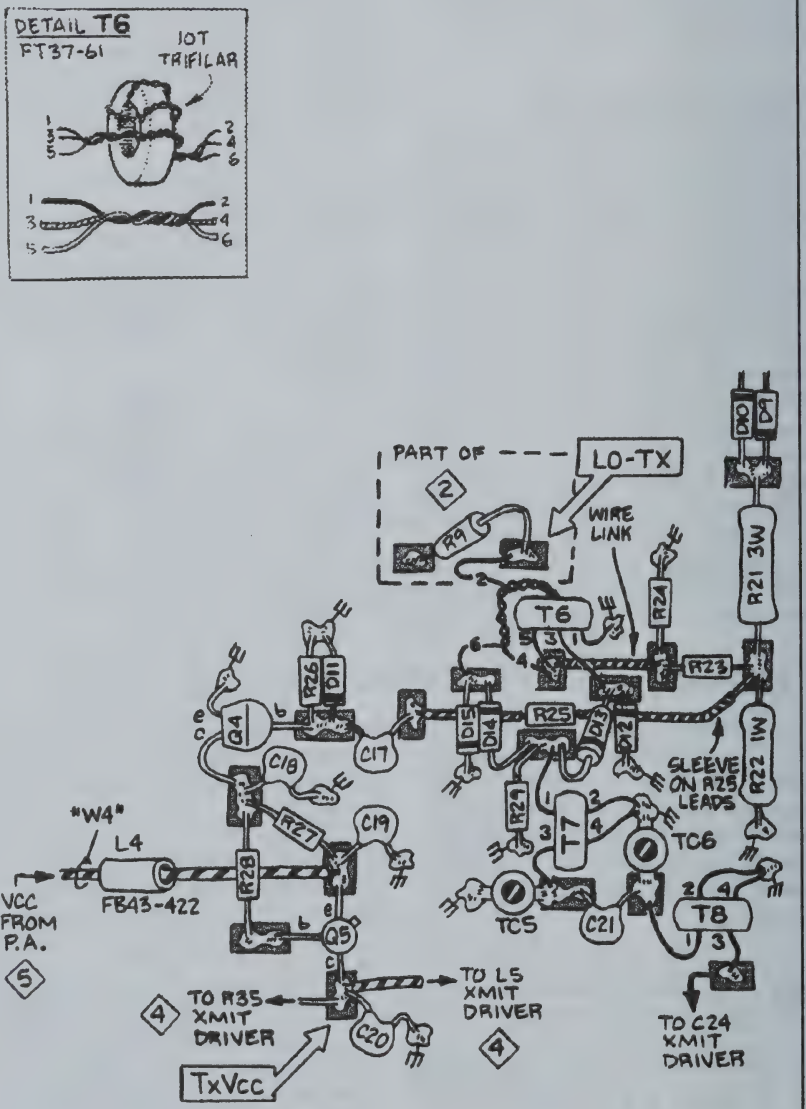
Construction continues with the transmit strip. It was build along the remaining edges of the substrate, beginning on the right side adjacent to the transceiver port and continuing in a "U" pattern, with the finals being adjacent to the receive strip input. This part of the circuitry is shown in **figure 15.**

For construction purposes, and to keep the assembly drawings from getting too congested, the transmitter was divided into four parts:
SEQ #3 - Transmit Mixer & T-R Switch
SEQ #4 - Transmit Driver
SEQ #5 - Power Amplifier (PA)
SEQ #6 - Output Filter/BNC assembly.

3 TRANSMIT MIXER CONSTRUCTION

Schematic	Assembly Dwg.
SHT. 5	SEQ. #3

The transmit strip input T/R switch is aligned with the coax connector, and feeds the input attenuator. This figure shows attenuator resistors R21 and R22 assembled from multiple ¼ watt resistors to achieve the required power dissipation. These units were replaced with single resistors of the proper value and wattage rating in the finished transverter. The transmit single balanced mixer was then added, inboard of the input attenuator. This was followed by the transmit band pass filter, which is shown below the transmit SBM in this figure. The two transformers in this filter (T7 and T8) were oriented 90 degrees to each other to minimize magnetic coupling between them, and to place the output of T8 close to the input of the yet-to-be built amplifier chain.



SECTION **XMIT DRIVER & T-R SWITCH** SEQ 3

2N2/6 TRANSVERTER
Designed by Jim Kortge, K8IQY
Drawn by Paul Harden, NA5N

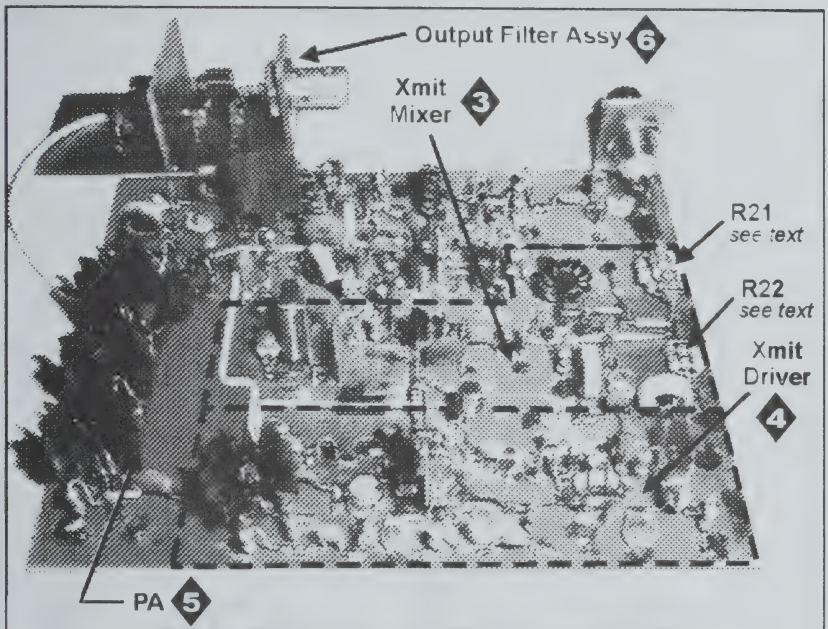


FIG. 15 - TRANSMITTER STRIP COMPONENTS

4 TRANSMIT DRIVER CONSTRUCTION

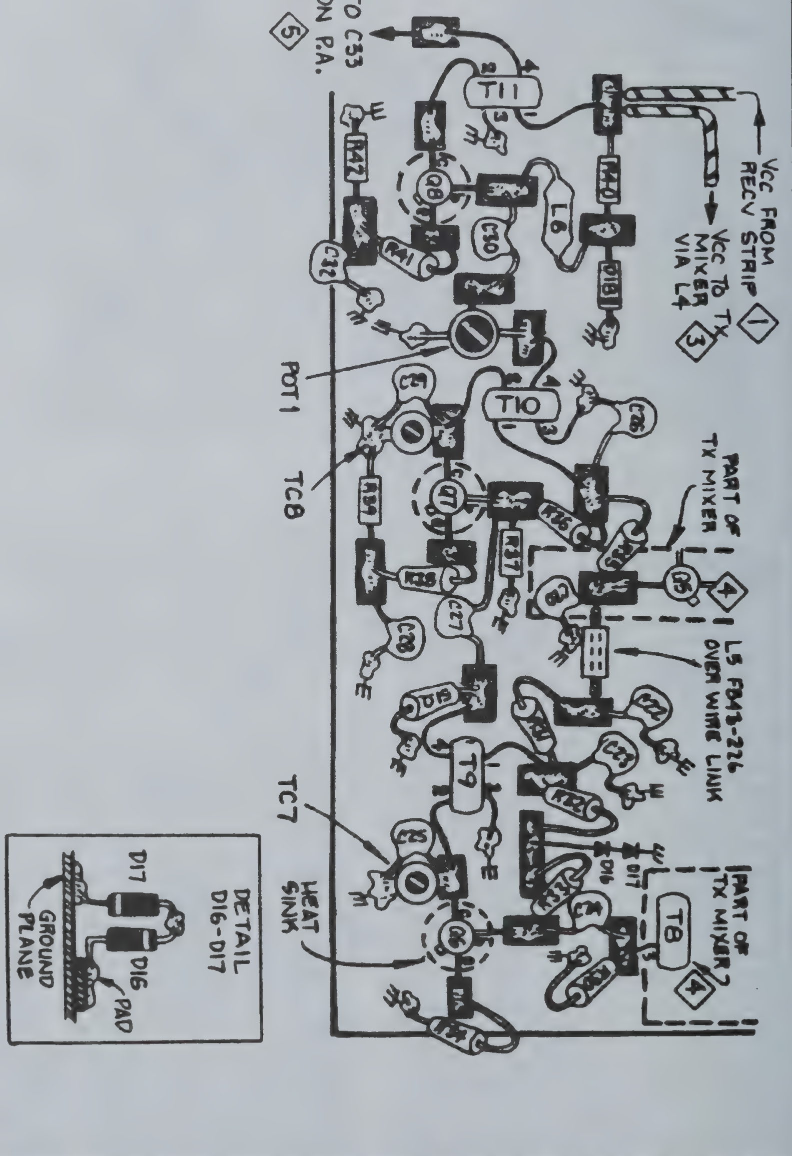
Schematic	Assembly Dwg.
SHT. 3	**SEQ. #4**

The transmit amplifier (driver) chain was then built along the front edge of the board, starting with the Q6 stage at the right, and proceeding left along the front edge, to the Q8 driver. Transformers T9 through T11 are wound using approximately 300 degrees of the toroid perimeter. This was done to reduce the inter-turn capacitance, which made the tuning sharper, and also improved the stability of the amplifier chain. Reason(s) for the improved stability brought about by the winding method are not yet understood! The heat sinks employed on Q6 and Q7 were originally constructed from 0.010 inch thick sheet brass. These worked well, but were eventually replaced for cosmetic reasons with commercially produced units.

5 POWER AMPLIFIER CONSTRUCTION

Schematic	Assembly Dwg.
SHT. 3	**SEQ. #5**

Completing the r.f. portion of the transmit strip entails building the final amplifier, or PA section, which is located along the remaining left edge of the substrate. This final uses approximately 3/32 inch wide by 1 ½ inch long strips of PC board material for the common base and collector busses. These busses, or "strips," are shown more clearly in figure 13 and the SEQ #5 assembly drawing. At the top end of this section are the components (C9, D1, D2, and L2) of the receive input T/R switch which were actually built along with the SEQ #1 receive strip construction.. Those components are also more visible in figure 13. Only C9 is shown on the SEQ #5 drawing for reference. It is important that Q9-Q11 have heat sinks.



SECTION

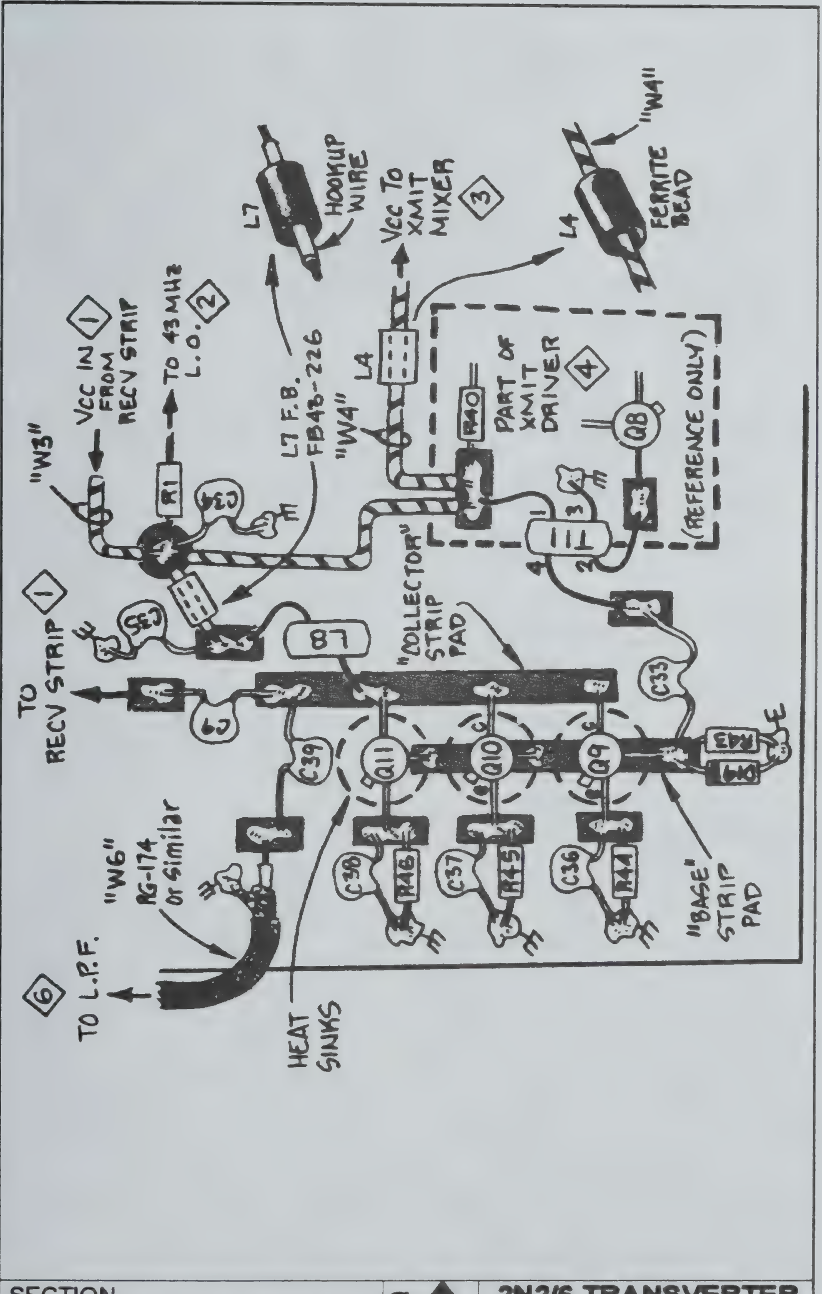
TRANSMIT DRIVER

SEQ 4

2N2/6 TRANSVERTER

Designed by Jim Kortge, K8IQY

Drawn by Paul Harden, NA5N



SECTION	SEQ	2N2/6 TRANSVERTER
POWER AMPL (PA)	5	Designed by Jim Kortge, K8IQY Drawn by Paul Harden, NA5N

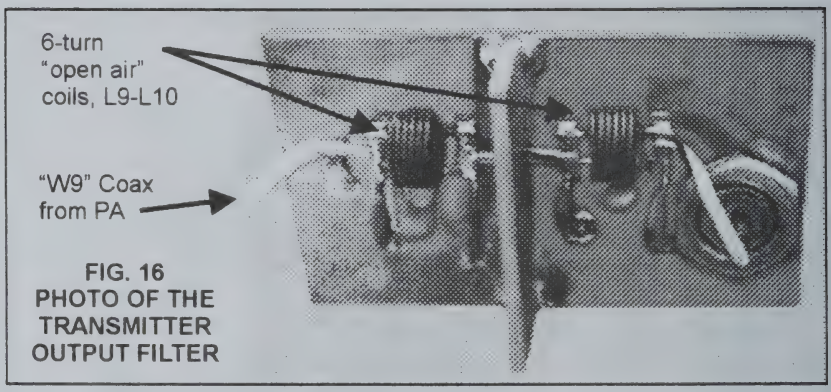


FIG. 16
PHOTO OF THE
TRANSMITTER
OUTPUT FILTER

6 OUTPUT FILTER CONSTRUCTION

Schematic	Assembly Dwg.
SHT. 3	**SEQ. #6**

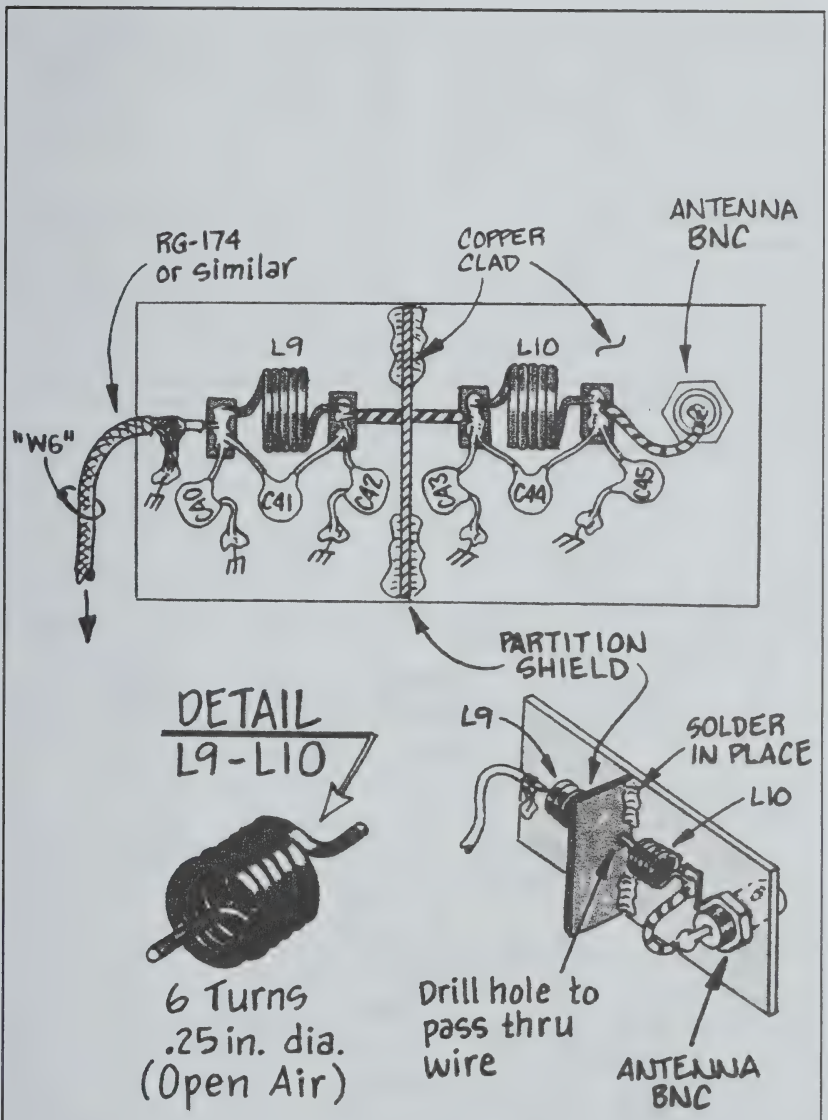
My original plan was to also have the output filter on this substrate also, but like the original 2N2/40, the output filter had to be placed on another board due to space problems. However, this really turned out to be somewhat of a good thing. It allowed experimenting with several output filter designs on a small substrate, and when the final configuration was decided upon, it was easy to mount it right at the antenna connector. Having the filter separate also expedited testing this section without having the main transverter board in the way. **Figure 16** shows the details of the output filter.

The 6 turn coils shown in figure 16 have been replaced with 5 turn units which improved the filters effectiveness in suppressing 2nd and 3rd harmonic energy.

Transmit Strip Alignment

Tuning up the transmit strip requires connecting a dummy load to the antenna connector. Then, the local oscillator is stopped by placing a short from the base of Q1 to ground. The reason for stopping the 43 MHz LO signal is that it is very easy to inadvertently peak the transmit strip on the LO signal, instead of the desired 50 MHz mixer component. After this step, a signal generator set to 50.0 MHz, and output level at –180 dBm, is connected between the LO port of the transmit signal balanced mixer and ground (across R29). Using a signal generator provides a cleaner signal for aligning the transmit strip and does not require keeping a driving QRP rig on the air for long periods while adjustments are made.

Once these steps are performed, a shorting jumper is placed on the collector end of R27, which switches the transmit strip on. Each of the stages is peaked, starting with transformer T7, and ending with T10. A few times through these four adjustments will have the transmit strip properly aligned. At this point, POT1 can be advanced to activate the driver stage, and T9 and T10 re-peaked, as there is interaction as power is supplied to the driver. POT1 can be advanced until 2 watts of power are indicated on a wattmeter. That's the maximum available from three 2N2222As running at 50 MHz. The final transistors should have heat sinks on them for this alignment, as should all of the upstream amplifiers and drivers stages.



SECTION
OUTPUT FILTER

SEQ 6

2N2/6 TRANSVERTER
Designed by Jim Kortge, K8IQY
Drawn by Paul Harden, NA5N

Output Power Transistors

How much power output can be obtained is *very* dependent upon the quality (gain) of the transistors used in the transverter. Using 2N2222A transistors from surplus sources is discouraged, as these will probably not be the best units available. That's probably why they were available on the surplus market..

DC Distribution and Interconnecting Wiring

Figure C shows the interconnecting wiring necessary for the 2N2/6. It's quite simple. Most of it is the DC distribution, from the DC input connector, via the fuse and fuse holder, to the board, and a few Vcc wire runs to the assembly sections. The only other wiring is connecting the two BNC connectors. All wiring can be done with standard #22 stranded hookup wire. The RG-174 mini-coax run from the transmitter to the Output LPF Filter can be #22 hookup wire as well, though a short piece of coax is recommended.

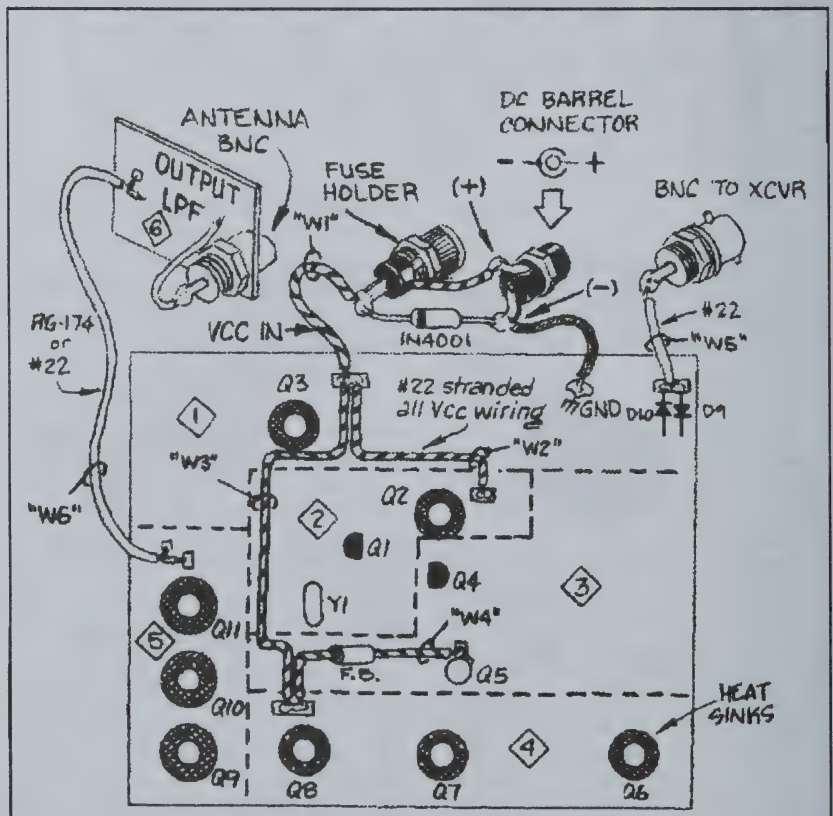


FIGURE C
DC AND INTERCONNECTING WIRING DIAGRAM

Current Status

Another 2N2/6 transverter has been constructed by Jay Chamness, W6JAZ to test the viability, and stability of the design before it was released to a broader audience via QRPp magazine. He built it from provided schematics and a color photo showing the layout. That unit was shipped to the authors in non-working condition. A quick check revealed the local oscillator was not functioning due to a building mistake. After minor changes, the local oscillator functioned properly, the transverter was functioning, and an alignment was attempted. Low power output was observed, eventually traced to another minor building error. After this error was removed, lower than normal output was still observed. Transistor Q7 was changed, and the output increased for that stage, but overall output was still low. Output transistors Q9 and Q10 were not getting warm during transmit, and were suspected to be failed. Both of these unit were replaced, and the output power increased dramatically. The rig was retuned, and was found to produce a solid 1 watt of output when driven by my 2N2/40, set for 2 watts of drive. This transverter is very stable, but does not produce as much power output as does the prototype unit. The difference most likely is due to the 2N2222 transistors used. I believe those used in this transverter are not as "hot" as those used in the original rig.

There are differences in the W6JAZ built transverter from the author's prototype. They were implemented based on feedback gained at Pacificon, most notably by Dave Meacham, W6EMD. Principally, the change was to reduce the standard bypass capacitor from a value of 0.22uF to 1000 pF, to help assure the bypass capacitors were not self resonant at 50 MHz. I suspect this change contributes to the better stability observed in this transverter over the prototype unit. The schematics have been updated with that change.

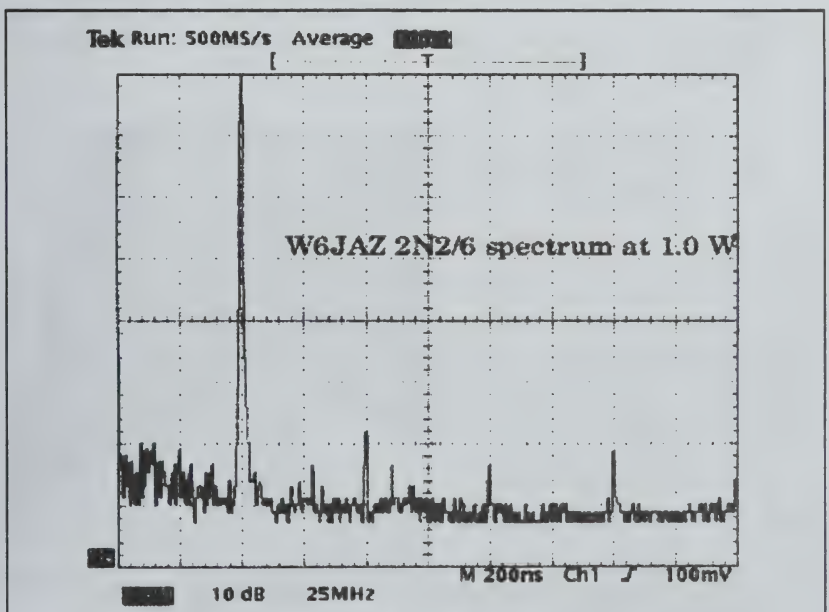


FIG. 17 - 2N2/6 OUTPUT SPECTRUM

Another change made in the W6JAZ transverter was in the elliptic low pass output filter. The physical size of L9 and L10 were too large, i.e. not ¼ inch inside diameter, as specified. These were rewound, and found to still have more inductance than required by the design, so a second set was wound with 5 turns instead of 6. These worked much better, and the power output increased a bit more with these new inductors. Also, the output spectrum was cleaner, so the design now specifies 5 turns for L9 and L10. **Figure 17** shows the output spectrum for this transverter while being driven by a signal generator connected to the 2 turn input link on transformer T7. The power output from the transverter was set at 1 watt.

It is gratifying to know that the design is such that at least a second unit could be built which functions reasonably close to the original prototype.

Summary

This was an interesting project from the beginning. It started out as an exercise to push the performance envelope of 2N2222 transistors, and experimentally determine if they could be used at 50 MHz. Once again the "cockroach of the transistor world" has shown its mettle in being useable well beyond its published operating range. In this experimental process , a very useable transverter design evolved, which will work with virtually all 40-meter QRP CW transceivers. Along the way, lessons were learned about building low-end VHF equipment using Manhattan Style construction techniques.

2N2222 vs. other transistors

Much room exists to "hot rod" this design by using transistors designed to operated in the low VHF region. It would be interesting and very educational to see how the performance and stability change when devices that are more appropriate are employed. I hope that someone will take the time to build part, if not all of the circuitry using better devices, so thatcomparative data are available.

APPENDIX: A 2N2/6 ALIGNMENT GENERATOR

As an aid in aligning the 2N2/6, a small signal generator was designed and constructed. The basis of the generator is a 50 MHz, ½ size can, crystal oscillator. With the addition of some common components, an approximate -18 dBm, 50-ohm signal source was constructed. It can be used to tune up both the receive, and the transmit strips.

Figure 1A shows how it was constructed, and **figure 2A** shows the schematic diagram for this alignment source.

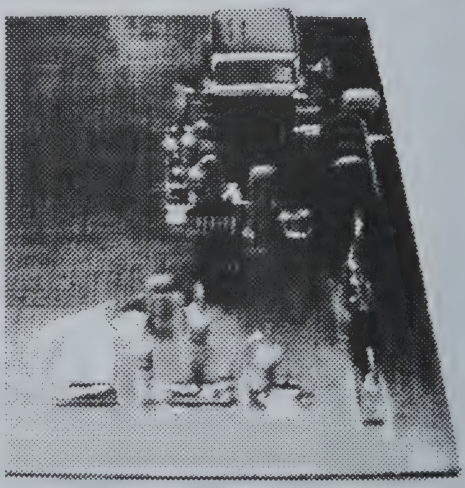
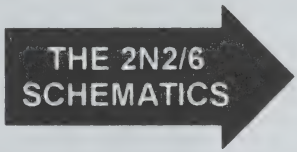


FIG. 1A
ALIGNMENT GENERATOR

Components D1,R1,C1 and D2 comprise a simple 5.3 volt power supply, to power the canned oscillator. The square wave output of the oscillator is coupled to C2, R2, and R3 to set its output impedance to 50 ohms. Output then passes through a 50 ohm low pass filter, comprised of components C3, L1, and C4. This filter attenuates harmonics of 50 MHz, leaving a reasonably clean, 50 MHz sine wave signal. The signal then passes through a 3 dB attenuator to provide a small amount of isolation, and to provide the desired –18 dBm signal level needed to tune up the transmit strip.

This alignment oscillator was built on an approximate 1 ½ by 2 ½ inch piece of PC board material. The power supply components are along the right edge. The canned oscillator is plugged into an 8 pin IC socket, mounted on ADEL nibbling tool produced rectangular pads. All remaining components were then built parallel to the power supply, so that the output is on the lower edge. The inductor shown has 6 turns, but was subsequently replaced with a 5 turn coil,.

Figure 3A shows an oscilloscope trace of the alignment generator in operation.



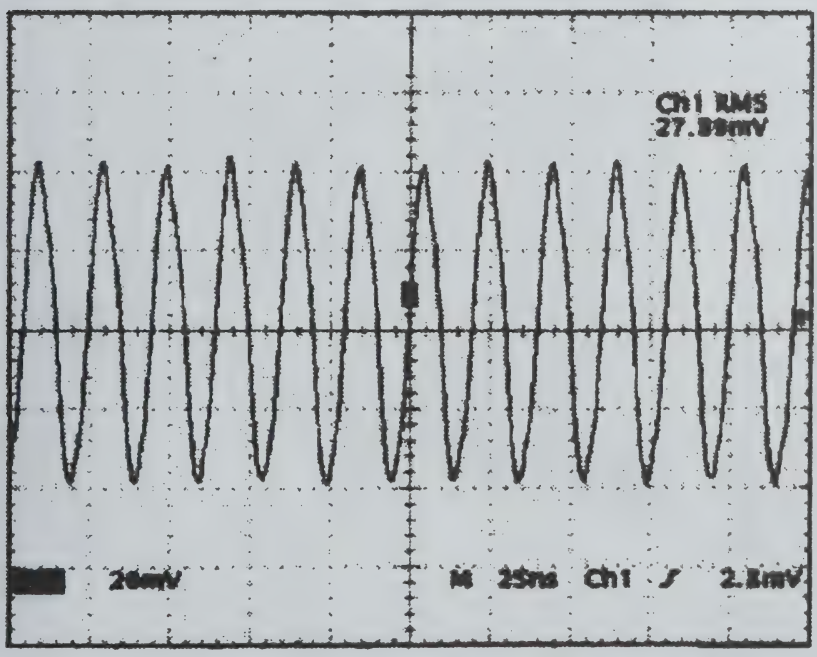
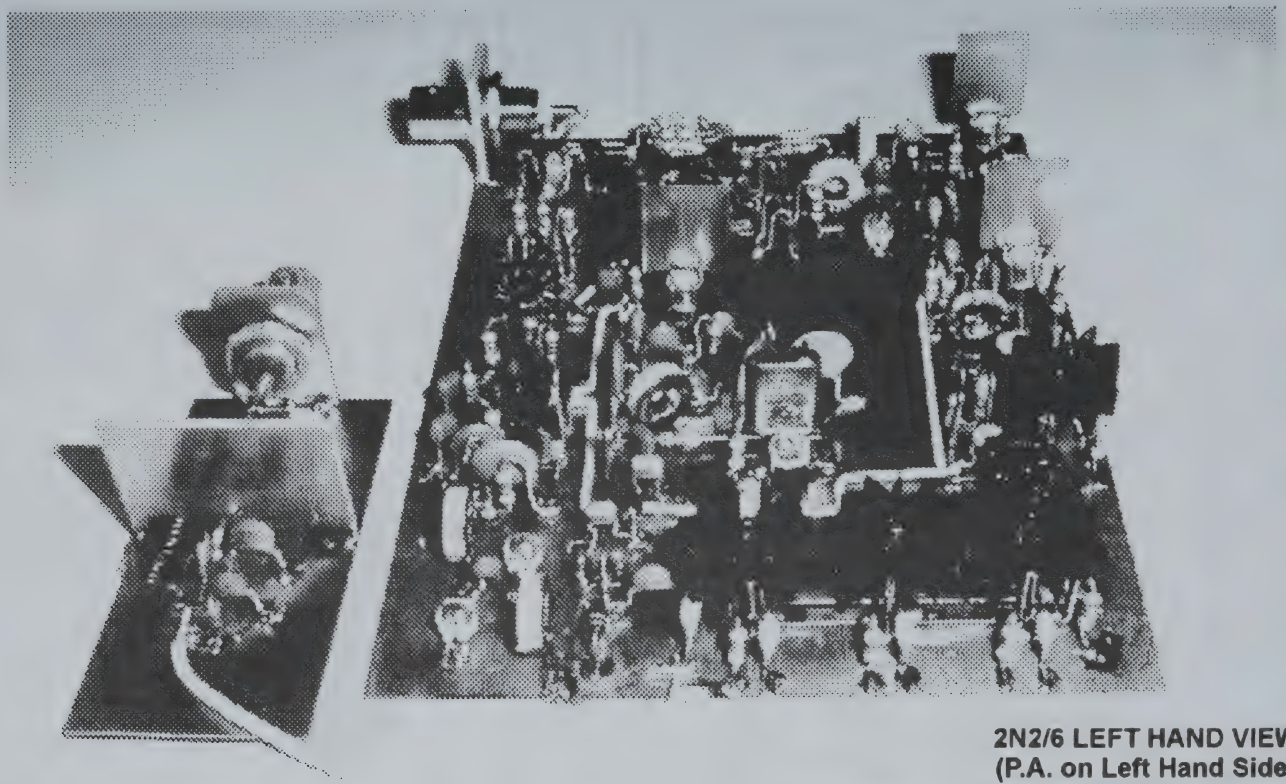


FIG. 3A - ALIGNMENT GENERATOR OUTPUT WAVEFORM

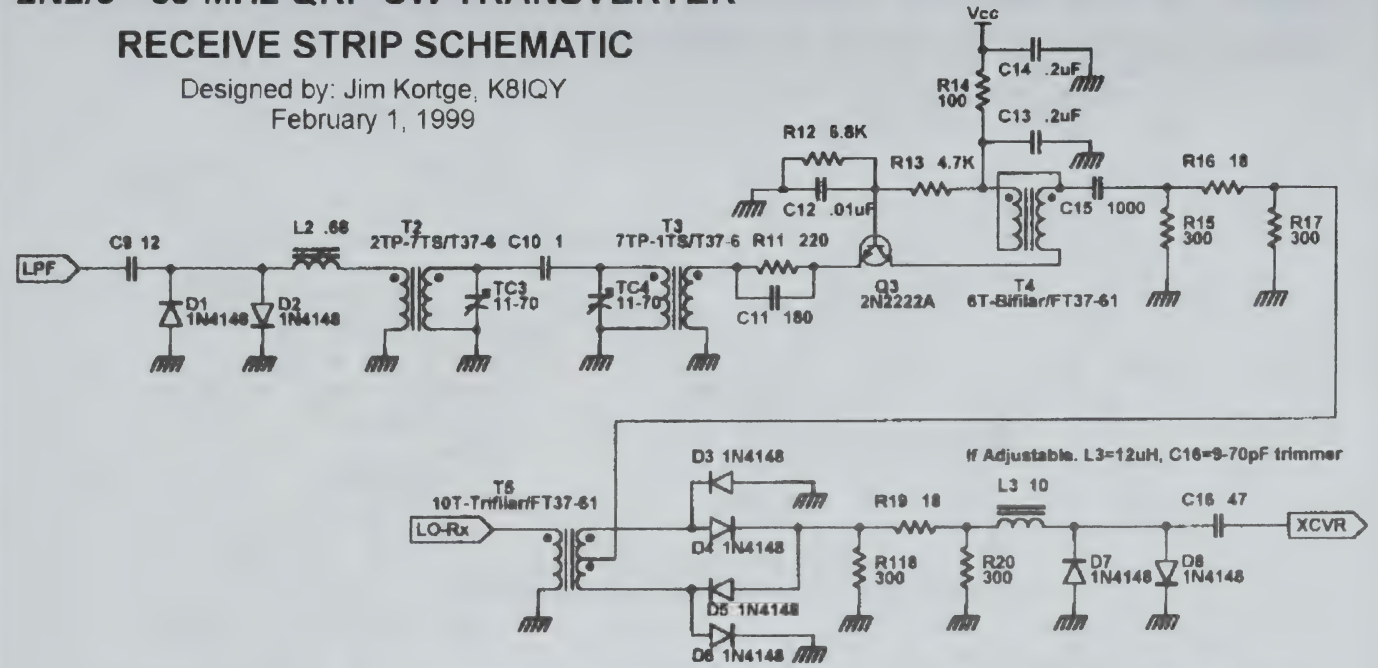


2N2/6 LEFT HAND VIEW
(P.A. on Left Hand Side)
See page 38 for Front View

2N2/6 - 50 MHz QRP CW TRANSVERTER

RECEIVE STRIP SCHEMATIC

Designed by: Jim Kortge, K8IQY
February 1, 1999



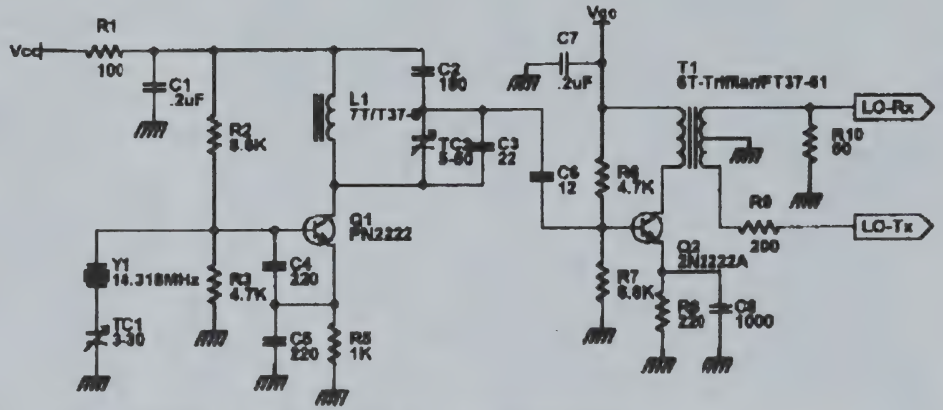
Note: All capacitors in pF and inductors in uH unless noted differently.

RCVR STRIP
SHT. 1 OF 3

2N2/6 - 50 MHz QRP CW TRANSVERTER

43 MHZ LOCAL OSCILLATOR SCHEMATIC

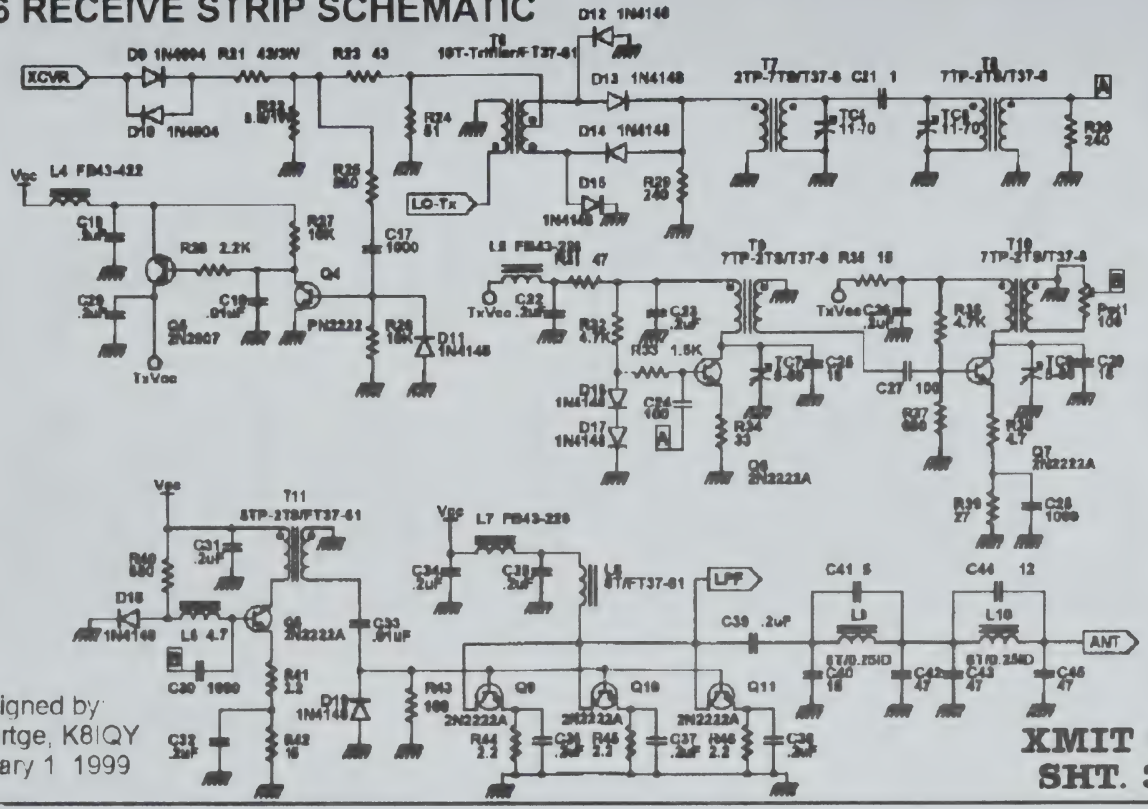
Designed by: Jim Kortge. K8IQY
February 1. 1999



Note: All capacitors in pF and inductors in uH unless noted differently.

43 MHz L.O.
SHT. 2 OF 3

2N2/6 RECEIVE STRIP SCHEMATIC



2N2/6 BILL OF MATERIALS SHT. 1 OF 2

ITEM	QTY	REF. DESIGNATION	VALUE	Order Part No.	
1	3	C12,C18,C33	.01uF		
2	1	C39	.22uF		
3	1	L2	.68uH		
4	2	C10,C21	1		
5	1	R33	1.5K		
6	1	L3	10uH		
7	6	R1,C24,C27,R14, R43,Pot1	100		
8	21	C1,C7,C8,C13,C14, C15,C17,C19,C20, C22,C23,C26,C28, C30,C31,C32,C34, C35,C36,C37,C38	1000pF (.001uF)		
9	2	R26,R27	10K		
10	2	T5,T6	10T-Trifilar FT37-61		
11	4	TC3,TC4,TC5,TC6	11-70pF		
12	3	C6,C9,C44	12pF		
13	1	Y1	14.318MHz		
14	3	C40,R35,R42	15pF		
15	4	C25,C29,R16,R19	18pF		
16	2	C2,C11	180pF		
17	1	R5	1K		
18	2	D9,D10	1N4004		
19	17	D1,D2,D3,D4,D5, D6,D7,D8,D11,D12, D13,D14,D15,D16, D17,D18,D19	1N4148		
20	1	D20	1N4744A		
21	4	R41,R44,R45,R46	2.2		
22	1	R28	2.2K		
23	1	R9	200		
24	1	C3	22pF		
25	4	C4,C5,R8,R11	220pF		
26	2	R29,R30	240		
27	1	R39	27		
28	8	Q2,Q3,Q6,Q7,Q8, Q9,Q10,Q11	2N2222A		
29	1	Q5	2N2907		
30	2	T2,T7	2TP-7TS T37-6		

2N2/6 BILL OF MATERIALS SHT. 2 of 2

ITEM	QTY	REF. DESIGNATION	VALUE	Order Part No.	
> 31	1	TC1	3-30pF		
> 32	4	R15,R17,R20,R118	300		
> 33	1	R34	33		
> 34	2	L6,R38	4.7		
> 35	5	R3,R6,R13,R32,	4.7K		
>		R36			
> 36	1	R23	43		
> 37	1	R21	43/3W		
> 38	5	C16,C42,C43,C45,	47pF		
> 39	1	C41	5pF		
> 40	3	TC2,TC7,TC8	5-50pF		
> 41	1	R10	50		
> 42	1	R24	51		
> 43	1	R25	560		
> 44	2	L9,L10	5T/0.25ID		
> 45	1	R22	6.8/1W		
> 46	2	R7,R12	6.8K		
> 47	2	R37,R40	680		
> 48	1	T4	6T-Bifilar FT37-61		
> 49	1	L1	7T/T37-6		
> 51	1	T3	7TP-1TS T37-6		
> 52	3	T8,T9,T10	7TP-2TS T37-6		
> 53	1	R2	8.6K		
> 54	1	L8	8T FT37-61		
> 55	1	T11	8TP-2TS FT37-61		
> 56	1	J1	Antenna Connector		
> 57	2	L5,L7	FB43-226		
> 58	1	L4	FB43-422		
> 59	2	Q1,Q4	PN2222		
> 60	2	P2A,P2B	Power Connector		
> 61	1	J2	Transceiver Connector		

Order Part number - Use to record exact part number/order number from Mouser, Digi-Key, Radio Shack, etc.

2N2/6 FRONT VIEW
(P.A. on Left Hand Side)
See page 35 for L.H. view

So Happy to Be Here

By Richard Fisher, KI6SN
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When **Doug Hendricks, KI6DS,** approached me about joining the staff of "QRPp," frankly I thought he'd gone nuts.

Here's a quarterly magazine that has been hugely successful because of its innovative approach to reporting primarily on the technical side of QRP.

So, why risk messing it up with a column about low power operations and QRP characters?

I never got around to asking Doug that question. When opportunity such as this knocks, it's best to open the door.

Knowing Doug as I do, I suspect he sees the need - and joy - of providing "QRPp" readers with more stories about themselves. Stories that originate away from the workbench.

Stories about adventures on the air. Stories about passionate QRPers converging on fast food joints to savor the friendship and bond a passion for low power operation instills in so many of us.

Doug genuinely loves this niche of the hobby.

And there's a lot more to amateur radio than plated-through PC boards and solder fumes.

He recognizes that, and wants to provide an anchored forum for it in "QRPp."

So, here I am.

THE WRITE STUFF

While I am a newcomer to "QRPp," amateur radio and journalism have been my bag for a lot of years in a lot of venues.

As a 14-year-old, my novice ticket arrived in February 1965: **WN1DWL.**

By summer I had my general: **WA1DWL,** and in October '65 I joined a relatively new organization called QRP Amateur Radio Club International, being issued membership No. 2419.

I'd go on to hold the calls **WA4KTN, N2EVH, N6MKA,** and finally **KI6SN.**

For a year of commemoration of pioneering QRPers of the 1920s, I held the call **nu6SN,** before reverting to KI6SN again for the long term.

But back in October '65, little did I know that more than 25 years later - in April of 1992, to be exact - I'd be joining the staff of QRP ARCI's quarterly journal "QRP Quarterly."

Under the editorship of **Paula Franke, WB9TBU,** I became its Members' News editor in 1992.

To the end of last year, it was a fine association with the magazine under the guidance of Paula, and her talented successors **Monte Starke, KU7Y; George Heron, N2APB;** and **Mary Cherry, NA6E.**

It's not uncommon in this business, however, to make changes for change's sake - and that was the case recently for me in deciding to leave the magazine.

Along the way, I was given the opportunity to write for **Worldradio,** a monthly magazine published by **Armond Noble, N6WR.**

In many ways, the QRP community owes Noble a huge debt of gratitude, because he is one of the few radio magazine publishers willing to dedicate space each month to coverage of QRP.

In late 1992, veteran QRPer **Rich Arland, K7SZ,** telephoned me from out

of the blue to ask if I'd be interested in taking the reigns of Worldradio's QRP coverage - a duty he had assumed for the previous seven years.

Obligating yourself to turn out good stuff about low power operations is a pretty serious commitment, for sure.

But I opted to take the chance. My first WR QRP column appeared in April 1993. And since then I haven't looked back. Under the editorship of **Rick McCusker, WF6O,** Worldradio continues to support QRP and QRPers, not only by dedicating significant space each month to my QRP column, but in devoting other editorial space frequently to stories about low power operators from other writers, too.

So, between writing for "QRPp" quarterly, and Worldradio monthly, what do I do in my spare time?

I was intrigued in 1996 by an e-mail from **Russ Carpenter, AA7QU.** As it turns out, he had been given my name by **Wayne Burdick, N6KR.**

The two of them had come up with an idea to form an organization - principally for QRPers - that would focus on outdoor radio operations from beautiful and remarkable locations that operators reached under their own power: hiking, rowing, bicycling.

They were calling it the Adventure Radio Society.

Russ and Wayne were looking for a "word person" to help draft a constitution, perhaps do some kind of newsletter, and get the word out that ARS existed.

Who can resist a good adventure? Not me. I signed on.

ARS is approaching its fourth birthday, and since 1998 I've been privileged to serve as the executive editor of the organization's monthly web magazine "The ARS Sojourner" *(www.natworld.com/ars)* as well as membership chairman.

AS I SEE IT...

As you might imagine, all of these journalistic duties have put me in contact with lots and lots of wonderful and interesting QRPers over the years.

In my association with the Northern California (NorCal) QRP Club as a card-carrying member, I'd have to admit this organization has its share of QRP characters. I'd like to get to know them better; bring their stories to you in these pages.

When you think about it, Doug makes a lot of sense in formally adding this dimension to "QRPp." After all, once all of the wonderful circuits have been finished and smoke tested, where do we go from there?

We go to the airwaves, to the field, to the swap meets and the conventions.

That's what I'm so looking forward to doing in these pages - bringing to life the people who so enrich this organization, with its roots of course, in founders Doug Hendricks, and **Jim Cates, WA6GER,** his trusted and valued colleague.

NOW IT'S YOUR TURN

That's my story - as it has unfolded to this point, anyway.

Now, how about telling yours?

Here are some things to think about:

+ **Milliwatting:** There are some fascinating tales to be told on QRPers' accomplishments in *really* low power communications. Have you given milliwatting a try? How'd it work out?

+ **QRP contesting:** It can certainly be addicting. How about sharing your contesting story? Your successes and failures. It's all part of the mosaic we call low power operations.

+ **QRP ragchewing:** Is this a lost art? Lots of people seem to think so. Some believe fewer and fewer QRPers are getting on the air for casual operating anymore. Is that the case? If you're a QRPer who doesn't need a contest to fire up your rig, let us know. We'd love to tell your story.

+ **QRP characters:** Our niche of the hobby is blessed with some of the most interesting characters in amateur radio. If you know of someone who'd make an interesting profile, please let me know. I'll do my best to bring them into the pages of "QRPp." And remember: We're *all* characters.

+ **QRP swap meets and conventions:** OK, not all the excitement is on the air. Tell us about your eye-ball QSOs at the QRP-related outings you've been on.

Have something you'd like share with "QRPp" readers? Please contact me at the addresses at the head of this column. Hope to hear from you soon. Let the fun begin!

MILLIWATTING ALONG THE GREY LINE - PART DEUX ...

Randy Foltz, K7TQ, of Moscow, ID, writes that "in the July-98 QRP Quarterly, as AB7TK, I reported a milliwatt QSO with **Bruce Hopkins, then KL7JAF,** that took place on March 5, 1998. We played QRP limbo down to 100 mW where Bruce reported a 339. There was good gray line propagation on 14.060 MHz with a solar elevation in Moscow of -5 degrees and in Fairbanks of +7 degrees. The solar flux was 100.

"On Nov. 17, 1999, now with the new call **K7TQ,** I found Bruce Hopkins, whose new call is **KL7H,** calling CQ on 28.061 MHz and repeated the limbo.

"I went down to 100 mW where Bruce gave me a 519. This time the gray line numbers were a solar elevation in Moscow of -11 degrees and in Fairbanks of -4 degrees. Solar flux had improved to 230.

"Both of these contacts were good for 16,960 miles per watt.

"Look for great propagation along the gray line just before the sun sets to around the end of twilight.

"Favored directions are north and south, although the seasons modify that a bit. It works!"

QRP: A LA MODES

Bill Jones, KD7S, writes from Sanger, CA that recently he decided to see if he could make "at least one contact using as many different modes as possible. I started out with a 2-way QRP CW contact followed by a quickie QRP SSB QSO.

"Then I switched over to Pactor followed by PSK31. Ten meters was open so I made my first contact ever using FM via an HF repeater.

"That was so much fun that I called an AM station (25 watts with that one) which reminded me how great AM sounds. I went back to 20 meters and got on RTTY for a little bit but had to go to 20 watts. I looked for an AMTOR contact but no takers.

"Finally I downloaded the MT63 software and made two low power contacts on 15 meters.

"To wrap things up I went to 14.230 and shared a couple pictures using SSTV at 25 watts. So, in a single day I worked nine different modes - CW, SSB, Pactor, PSK31, AM, FM, RTTY, SSTV and MT63. Kind of goofy I guess, but lots of fun."

A K2 ADVENTURE

Rod Cerkoney, N0RC, writes from Fort Collins, CO that despite what the Weather Channel said, a Friday in December "was not partly sunny, or at least it didn't start out that way. It was mostly cloudy here - the dark 'bunchy' kind of clouds that suggest precipitation.

He was on a one-man "operating event" heading out into the field that also had the criteria of being in "interesting or historical places."

"I'd been planning these 'Kopkopelli' adventures for some time, just waiting for a good opportunity."

His sojourn from Colorado to Wyoming was, in part, to help QRPers get Wyoming for their WAS award.

"As I traveled north to Wyoming, things didn't change much, it just got windy (about 30+ miles per hour from the west and south).

the west and south).

"As I transitioned from northbound I-25 to westbound I-80 there were light snow showers in the air. And it was still windy, the blow-your-car-around kind of windy. I arrived at my general location about 9:30 a.m. This was good. I wanted to have enough time to scout out a good operating location.

"At the exit for Vedauwoo was another sign. It was for Ames Monument. I had plenty of time so I took a little side trip. Turns out Ames Monument is the marker for the high point along the Union Pacific Railroad of the mid to late 1800s! It was built by UPRR in 1882. To mark the spot, it sits at 8,200+ feet in elevation.

"A sign at the monument informs that the town of Sherman once was nearby. But it has long since disappeared.

"I stayed there for a while and let my imagination run, wondering what this place was like in the1800s. I considered Ames for an operation location. It's wide open, with horizons many miles away in all directions.

"I rejected the notion because of the wind. It was 30+ gusting higher maybe to 40-50 mph.

"Folks who have never been to Wyoming don't know what I'm talking about when I mention the wind. It is always windy there.

"On to Veedauwoo, light snow is falling again as I enter the park. As the day wore on the skies cleared but the wind remained.

"Temperatures were in the upper 30's. In the distance I could see Poland Hill, Turtle Rock, and Devil's Playground - rock formations carved over the millennia by the forces of nature.

"Not as grand in scale as Utah's Canyon Lands but against the juxtaposition of the high rolling plains of Wyoming, interesting.

"In the air, above a broad flat plain, a hawk is soaring, nearly motionless. For those who want a better idea of where I was at: trace out I-80 east bound from Laramie, WY.

"About 10 miles east of Laramie is the highest point on I-80 (8,640 feet), it should be marked on most maps. The next exit from there, a few more miles along I-80, is the exit for Veedauwoo and the Ames Monument.

"By 11a.m., I'm set up in a little depression near one of the rock formations with low pine trees scattered around, sheltered from the wind. It's not an ideal antenna location, but not bad either.

"I spent about an hour tuning the bands and listening to the NCDXF beacons to get an idea where to start.

"Ten meters was 'iffy,' but I gave it a try for a while, then dropped to 15 meters. That seemed to be the bread and butter band. The California beacon was loud, and so was the Hawaii beacon.

"Transposing those distances to the east I figured 15 got me coverage from the U.S. east coast and New England, on into the eastern fringe of the Midwest.

"Oddly, 20 meters did not produce many contacts . . . Some stations' first call was loud and clear but they dropped into the mud for the exchange. Perhaps it was the physics of propagation mashing our signals around. Or, maybe it was the ancient Indian spirits, toying with us. I prefer to think it was a little of both.

"The setup on my end was my G5RV inverted-V style. I used a DK9SO collapsible mast to hold up the center at about 30 feet The ends suspended about 6-8 feet up. The mast was lashed to a nearby fence.

"Coax trailed off the mast into the cab of my pickup. On the passenger side I had a large wide board resting on the seat, cantilevered outward onto a support in the foot well. It was a nice work surface, but a little cramped. I used my K2, Serial No. 286, the whole time. An MFJ 949 did the antenna matching, and my Shurr Profi's did the talking.

"Folks, the K2 is a great radio for this kind of operation. I set up the keyer to call

CQ every 15 seconds. I kept the filters wide and tuned the RIT (in wide mode) to find people. When things got quiet I was able to keep the CQs going while I tidied up the log or grabbed a snack.

"I had a blast, and will be doing this again. In fact I may just schedule a day trip to Wyoming 3 or 4 times a year. It's a great way to play hooky from work! This was something I've been wanting to do for a long time, since getting into QRP. Many thanks to **Bruce Muscolino, W6TOY,** for providing the catalyst to get me to act. Thanks to all who took time to seek me out. To those I missed, my apologies. There will be another time."

1999 QRP "To the Field" Results

by Jan Medley, NØQT
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Finally, and at last, the 1999 *QRP TTF* results are done! It seemed almost destined not to be. I was asked by Doug Hendricks if I could be the new NorCal Contest Manager after Joe Gervais, AB7TT, was forced to resign due to strenuous work commitments. I agreed, figuring "how hard could this be?" Famous last words, I soon learned. Joe forwarded me the logs after PacifiCon and I began going through them, only to discover many inconsistencies in the way each log was scored. So finally, I went through them all, log-by-log, and rescored them all. Most of this stemmed from some obvious confusion on how to score the *border stations* and the *Taco Bell stations*. It was intended to earn the bonus points for *each* Taco Bell worked, and likewise, if you worked a border station, the 2, 3 or 4 states involved counted as that many QSO points on that contact, as well as that many SPC's. The rules for the 2000 QRPTTF follow this article, and hopefully the scoring will be easier to follow. None-the-less, I felt it necessary to check and rescore each log so the scores shown below are more or less on the "same playing field" ... QRP *to the field* field, that is.

Unfortunately, there just isn't the room in this issue to print the *soap box* comments, except to report it sounds like everyone had a great time, plenty of adventures finding "that border" and the trials and tribulations getting to the site or returning. Nobody lost an oil pan or anything in 1999, but a few close calls with bugs, snakes and curious police. Some of the *soap box* comments will be posted on the NorCal webpage.

Thanks to all who participated, and we all look forward to working you in 2000!

1999 QRP To The Field 1999 Results

STN Call	Claimed QSO's	Total Pts	Chk'd QSO's	FINAL SCORE	LOC	Ops	Borders	Band
DX Stations								
VE7SL	109	201160	110	230020	FD	SO	1	All
VE6QRP	88	218240	86	199520	FD	MO	1	All
VE3QDR	44	26320	54	114240	FD	MO	1	All
HP1AC	67	131320	67	131320	HM	SO	1	All
VE6AAN	24	9360	21	12300	HM	SO	1	All
JR0BAQ	4	800	4	560	HM	SO	1	20m
Field Stations								
N2CQ	69	34680	69	51800	FD	SO	1	All
WD7Y	69	47520	70	49640	FD	SO	1	All
K7GT	56	27600	58	29760	FD	SO	1	All
W0YSE	47	28420	47	28000	FD	SO	1	All
AF5Z	34	18720	34	18720	FD	SO	1	All
KI7MN	16	6720	19	6720	FD	SO	1	All
WO3B	21	5720	21	5280	FD	SO	1	All
W3BTN	162	238740	189	278760	FD	MO	1	All
N7KE	152	123872	145	159000	FD	MO	1	All
N6WG	102	84240	102	86400	FD	MO	1	All
W2IV	89	83720	83	83660	FD	MO	1	All
K4AVX	47	27540	47	31620	FD	MO	1	All
K5RAC	20	8400	29	13020	FD	MO	1	All
KK4R	23	6440	23	6720	FD	MO	1	All
AK7Y	122	252000	143	308040	FD	SO	2	All
AE4GX	81	139440	80	139440	FD	SO	2	All
AE2T	72	131040	72	132720	FD	SO	2	All
WU0L	110	152320	67	89760	FD	SO	2	All
K4JSI	48	66560	48	69960	FD	SO	2	All
KO4WX	56	68400	56	68400	FD	SO	2	All
K1CL	54	64800	54	64800	FD	SO	2	All
W1FMR	35	51000	47	44160	FD	SO	2	All
WB1HBE	28	32760	38	35880	FD	SO	2	All

1999 QRP To The Field 1999 Results

STN Call	Claimed QSO's	Total Pts	Chk'd QSO's	FINAL SCORE	LOC	Ops	Borders	Band
Field Stations (con't)								
NA5N	29	9280	29	11600	FD	SO	2	All
KV2X	21	21840	21	10560	FD	SO	2	All
N1EI	9	4680	16	8840	FD	SO	2	All
KB0VCC	12	5760	16	7680	FD	SO	2	All
AB5UA	94	206000	94	214240	FD	MO	2	All
W0UFO	67	126000	87	162000	FD	MO	2	All
N0UR	214	742560	213	989880	FD	SO	3	All
N4DD	153	639600	151	618240	FD	SO	3	All
W0CQC	100	222480	100	234840	FD	SO	3	All
N0EA	130	509580	131	540000	FD	MO	3	All
Field -Single Band								
N6KM	9	1980	9	1540	FD	SO	1	20m
K4AGT	75	106080	75	122400	FD	SO	2	20m
WE6W	53	11660	53	12720	FD	SO	1	40m
KF4KSM	22	12320	28	8400	FD	SO	1	40m
W9WAC	41	8200	36	5040	FD	MO	1	40m
W4IM	45	43680	45	47840	FD	SO	2	40m
Taco Bell Stations								
AB8DF	66	86800	63	93840	FD	SO	TB	All
K0SU	25	28000	32	35000	FD	SO	TB	All
KB2JE	33	28120	33	28120	FD	SO	TB	20m
N6GA	18	8640	18	9120	FD	SO	TB	20m
N7FF	42	37800	42	37800	FD	MO	TB	All
Home Stations								
W4ED		65880	105	70150	HM	SO	1	All
K8CV	101	1270	124	61920	HM	SO	1	All
W5TB	87	41800	87	44650	HM	SO	1	All
K1QM	79	33970	78	35640	HM	SO	1	All
KQ0I	33	13690	58	22940	HM	SO	1	All

1999 QRP To The Field 1999 Results

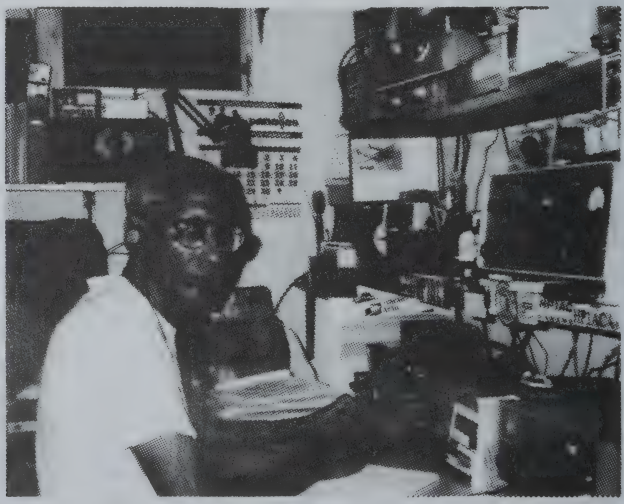
STN Call	Claimed QSO's	Total Pts	Chk'd QSO's	FINAL SCORE	LOC	Ops	Borders	Band
Home Stations (con't)								
N7GS	42	7210	44	13340	HM	SO	1	All
N0IBT	19	4680	26	4860	HM	SO	1	All
K2UD	27	4350	25	4760	HM	SO	1	All
AB6SO	18	3040	22	3680	HM	SO	1	All
K8DD	12	1820	14	1650	HM	SO	1	All
WD8MNV	10	880	10	880	HM	SO	1	All
WA8GHZ	19	3230	19	3400	HM	SO	1	20m
K4JPN	14	1680	16	2040	HM	SO	1	20m
K4KJP	6	600	8	720	HM	SO	1	20m
AA1OF	6	490	9	700	HM	SO	1	20m
W8TIM	30	5440	32	6600	HM	SO	1	40m
WA8RXI	28	5510	28	5220	HM	SO	1	40m
KA8LLE	25	3900	24	4000	HM	SO	1	40m
N8CQA	17	1800	17	1800	HM	SO	1	40m
W7TAO	82	33200	99	49350	HM	MO	1	All

1999 QRPTTF PHOTO GALLERY

Everbody's favorite QRP DX station ...

HP1AC

"Cam" Castillo at his shack in Panama

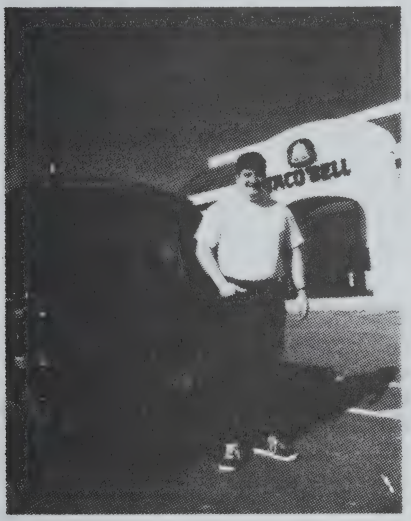


It just never seems like a real QRP contest if you don't work our friend, HP1AC. Cam sported 131,320 points in this year's QRPTTF with his TS430S and TA33 Jr. beam, splitting his 49 QSO's evenly between 15M and 20M.

"Run to the Borders" - *Taco Bell* Style

In 1998, I received an email from an AZ ScQRPion (I regret I can't remember whom) who said the closest border to him was Taco Bell. That spurred the idea for 1999 to give a station working within "field of view" of a Taco Bell, border status. To our surprise, we had 7 stations that signed "/TB" of which 5 submitted their photographic proof. It added a most interesting element to QRPTTF, and a hearty thanks to those stations who gave up all human dignity and actually worked the contest from a Taco Bell parking lot! A few of the guilty are presented here.

--Paul, NA5N



"Photo shows my actual operating position. QRP+ on passenger seat, Bencher paddles on console, 2 kids in the back and mom was out of town!"

Taco Bell #16259
Rt. 23S, Wayne, New Jersey
Walter Windish, KB2JE/TB

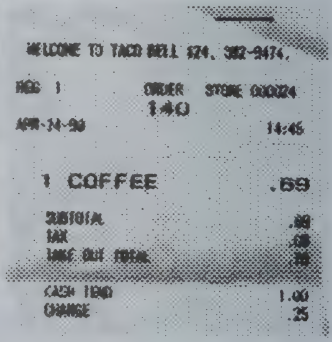
Taco Bell #19615
Morgan Hill, California
Frank N7FF and W6JZE

Pounding away on their NC40 and DK3 screwdriver antenna."

Taco Bell #24
Claremont, California
Cam Hartford, N6GA

"I never guessed how much ignition noise would be generated by people idling in the Taco Bell drive-thru lane! Fun contest when I could hear it."

Cam even submitted his Taco Bell coffee receipt!



Taco Bell #3431
Colorado Springs, CO
Rick Brown, KØSU

"Lots of fun - operating from the car was different. Heard lots of stations I could not work, except EA5OM! What happened to spring, anyway"
Note the snow at Rick's Taco Bell!

Taco Bell #9467
Brainerd, Minnesota
Tom Jones, WØQF

Tom worked 120 stations with his Sierra, 20M Bobtail antenna and an SWR higher than the price of a TB taco.

Strapping a beam to a "John Deere" tractor at the farm of Ed, VE6EDP put **VE6QRP** on the air for QRPTTF. Ops were Duncan VE6QRP, Russ VE6CGO, Niels VE6NJK, Dave VE6DV, John VE6ZAA, Harold VE6HFW and Heinz VE6AQW. This excellent station netted 218,240 pts. Canadian ingenuity at its best!

The view from the MO/OK/AK border station of Wayne NØEA, Red K5ALU, Dan NØDT and Gary KØBC. They used an inverted V and TA-33Jr beam to work 540,000 points.

1999 Zombie Shuffle Results

Ninety-one QRPers participated in the **1999 Zombie Shuffle** and awarded their official *Zombie Death Certificates.* In fact, the "causes of death" were so interesting, we decided to include them here with the results.

We'd like to thank Doug Hendricks and NorCal for donating the world-class *Zombie Lapel Pins*, that will no doubt be highly sought collector's items. But most of all, to thank the 91 Zombies who participated, had fun, and yet still have no clue as to what the point of the Zombie Shuffle was!

Jan did a great job lining up a host of guest *Elvis'* for the evening ... lot's of fun finding those Elvis's behind all those famous QRP calls. And of course the added bonus of working Ed Hare W1RFI and gang at W1AW on the original TT2.

72,

Paul NA5N	Jan NØQT
Zombie #004	Zombie #015
Grand Zombie	Contest Coroner

Call	QSO	W1AW	TOTAL	Cause Of Death
N9AW	77		40755	Crushed by QRM
N4ROA/Elvis	64	1000	33243	Too much shuffling and static zapped me
K7FD	55	1000	31314	None
KU7Y/Elvis	58	1000	30584	QRP-L
WE6W/Elvis	43		24899	Was up 1-4am nite before!
AL7FS	44	1000	22577	20m died and 40 had too much broadcast and noise
KA1AXY	15	1000	22260	RF burns
W5VBO	49		22189	Way too much fun & premature baldness
K5ZTY	41		21181	QRN
W6ZH	36		20890	Overdose of non-obtainium
WO3B	27		19202	Attended QRO Field Day
K1QM	30		18132	Brain dead
KB6HE	34		17003	Viagara
NW7DX/JR	31		16225	Runaway lawnmower
WØCH	23	1000	15011	Inhaling toxic rancid core solder fumes
W9SUL/Elvis	29		14246	XYL
W8SFF	25	1000	14222	She, who wasn't obeyed!
VE3VAW/Elvis	19		14044	
HP1AC	24		13342	RF
NØRC/Elvis	19	1000	12931	Fat Free food consumed on odd numbered days within 5 days of a full-moon
WB3AAL	21	1000	12819	My time expired. Worked all 4 hours.
W5USJ	24		12592	QRN, QRM, es etc on 40
WA9PWP	21	1000	12234	Thunderstorm --lightning stricken
AK1P	19		11890	Terminal tintinitus

Call	QSO	W1AW	TOTAL	Cause Of Death
NQ7X	21		11764	unknown?
AC6KW	23		11665	
VE6BPR	22		11346	Combination of QRM on 40m and de-alcoholized beer
NK9G	16	1000	11161	Broadcast out
W4NJK	7		11155	QRP comatose, previous QRO RF shock
WA3WSJ	18		11065	
K1MG	15	1000	10879	Too much fun
WD3P	13	1000	10832	Life
N2CQ	14	1000	10619	Marriage
NØQT	18		10565	Terminal writer's cramp
WBØYPO	20		10560	Grabbed a B+ line & ground at same time. Now need to touch B+ to operate
KGØEW	18		10528	Last words were: "Hey dudes--wanna see something cool? Watch this!"
W7ILW	15		10510	Ate too much pumpkin pie
WB4JJJ	16	1000	10274	
WA6OWR	19		10255	Of course
K5OI	15		10249	Boredom--waiting for SSB stations to leave 7.040
W6SU	14		10004	Undetermined
WA5WHN	19		9757	
NM8Y	13	1000	9729	XYL hit me over the head with K-2 for doing "happy dance"
K6RPN	16		9411	Heart failure from fright
K4NK	16	1000	9344	Fell off tower
N9MZP	14	1000	9296	Major transistor failure
KI7MN	17		9057	QRM'd
W3BBO	17		9054	No Body (knows)
K7TQ	15		8642	Overworked and Underpaid
WD8KQY	15		8201	Too much fun during Zombie Shuffle
KX7L	13		8111	SSB QRM from contesters on 40M!
AB8DF	11	1000	8033	Teenagers drove me over the edge
N7KT	14		7940	No more signals -adrenalin drained out
W2EB	16		7706	Not yet, thank you!!
N5WU	15		7690	Over work and not enough time for radio play

Call	QSO	W1AW	TOTAL	Cause Of Death
KIØKY	14		7587	Hyperexcitement acerbated by TT2 failure prior to the corpse's chorus
K1VP	15		7401	Don't know, I couldn't say, being dead and all
NUØV	13		7119	Too much fun
KQ5U	20		6870	Birthday on 10/31/41
N2VPK	13		6768	
N8IE	13		6719	Wife, 3 kids, mortgage, car payment...
W3CD	7	1000	6449	Not so fast! :)
N9WR	14		6434	Drowning (N9-Water Rat)
N2EI	10	1000	6417	
K8CV	11		6396	
WØQK	14		6335	40/80m Static
N3XRV/M	11		5940	CW at 70 mph
N4UY	14		5891	
N3AT	14		5750	QRM
K6MW	10		5521	Ringing in ears after listening to 40m
WA8RXI	10	1000	5474	
N5NW/Elvis	5	1000	4994	The King will never die...
WA5BDU	7	1000	4627	QRP fever complicated by 40m noise & QRM
N4EUK	7		4414	Bad pizza
KC2CLL (T+)	7		4277	Terminal vitamin D deficiency due to shack in dungeon (cellar)
N5YAK	9		4105	Electrocution from QRO amp
K2REB	3	1000	4068	Electrocuted while adjusting antenna
AI4CW/JR	5		3909	Bad meatloaf; compounded by QRM
W5TB	8		3787	Operating from banks of the "Skull Crusher" River in Arkansas
KIØG/TT2	5		3690	
K7SZ	7		3529	
KA5T	6		3307	
W4IM	5		2840	
KK5NA	5		2563	QRN
AA2VK	4		2270	Cells drained
KC7EAY	5		2260	Electrical mishap
WW4MC	9		2733	pneumonotramicroscopic-silliacovacaniosis
KE5TC	1	1000	1666	W1AW/TT2
N7TAU	3		1527	Fright!!!

Call	QSO	W1AW	TOTAL	Cause Of Death
KE5TC	1	1000	1666	W1AW/TT2
N7TAU	3		1527	Fright!!!
KCØBDW	2		968	RF Burns
W3AA/KB3BYT	1		941	Mob demonstration
N6CHV	1		815	
WD6BOR	1		685	Anxiety trying to work CW for the 1st time in a year during a 40m SSB contest.
VE5QRP/ VE5RC/Elvis	7		666	
K6JS/KF6PJM	1		502	K6JS=Insanity, KF6PJM=Ham Fever
W8ERV	1		402	QRM
AE4IC Elvis	27	not	rept'd	SSB contest on 40m
KØYO	5			Rusty nails

Everyone who participated in the Zombie Shuffle, and who sent in an envelope, received the above official **ZOMBIE DEATH CERTIFICATE** and ***Zombie Lapel Pin*** - hereby becoming official Zombies. If you didn't get one for the '99 Shuffle, we'll be sending them out the Death Certificates again for the 2000 Zombie Shuffle. It will *probably* be held on the Friday evening before Halloween, October 27, 2000. Rules to be announced on QRP-L.

QRP To The Field 2000 - *Water World*

Saturday, April 29, 2000

• OFFICIAL CONTEST RULES •

Date: Saturday, April 29, 2000
Time: 1500 to 2400 UTC (pick any 6 hours)
Bands: 40-20-15-10 meters, in the vicinity of the QRP calling frequencies: please be courteous to others
Mode: CW only
Power out (QRP only): 5 watts or less

The theme for this year is to get outside and get as close as possible to a water location! Sorry...bathtubs, toilets, sinks, leaky plumbing, water bottles and the like don't count. Just about everyone has a nearby location that involves some kind of lake, pond, river, canal, ditch, whatever! If you can't get away to be near the water, then set up out in your back yard or on the back porch and be a field station. *The whole idea of* ***QRP to the Field*** *is to get outside and operate!* So pack a lunch and get out there. Let's have some fun! A note of seriousness here. **Please keep your personal safety in mind**, especially Marine Mobile stations. Don't attempt to go out on the water before the fog has cleared, and please don't stay out on the water after dark. We want to have everybody around for next year too. So use a little common sense and please obey the laws governing your location. Select any 6-hour operating period. If you need to split it up into two or three hour intervals to accomodate other plans, then do so. Jump in there when you can, but only work a total of 6 hours.

Categories:

- **Marine Mobile (MM) ...** ***must submit photograph of operating position!*** Whether you're on a ship, canoe, kayak, raft, innertube or what have you....if you are afloat, then you're marine mobile. DO NOT sign /MM after your callsign, it will be part of the exchange.
- **Ocean (OC) .....** ***must submit photograph of operating position!*** This category also includes the Great Lakes and the gulf, cuz those babies are huge!
- **Other water (WT) .....** inland lakes, rivers, streams, park ponds, ditches, canals, etc.
- **Field station (FD) .....** any station that is outdoors and not using commercial power or fixed antennas.
- **Home station (HO) .....** any station that is operating from an indoor or home location.

Exchange: RST + SPC + Category identifier (two letters)
Example: 559 NM WT -or- 55N CA OC

Scoring: **25 pts** - for each **MM** station worked per band
20 pts - for each **OC** station worked per band
15 pts - for each **WT** station worked per band
10 pts - for each **FD** station worked per band
5 pts - for each **HO** station worked per band

SPCs: (State/Province/Country) count once per band

Location Multipliers: MM = x5
OC = x4
WT = x3
FD = x2
HO = x1

Final Score: Total pts x Total SPC x Location = Final score

A summary sheet is available at the Norcal web site:
http://www.fix.net/~jparker/norcal.htm

Deadline: ***Send complete logs and summary sheets by June 1, 2000.*** Summary sheets must include a description of location and equipment used; also include photographs where indicated above. Pictures must show your station location and the water in the same field of view. Your log should include a minimum of time (in UTC), callsign of station worked, complete exchange received, RST sent (if not a static exchange). Incomplete submissions will be used as check logs.

Email submission (except MM & OC stations): send complete logs and summary sheets in ASCII text format only to:

nØqt@arrl.net

Please send ***text format only***, all other forms will be rejected, so no html, word processor documents or attachments please.

Snail mail (including MM & OC stations): send complete logs and summary sheets and photos to:

Jan Medley NØQT
QRPTTF 2000
P.O. Box 1768
Socorro NM 87801

QRPTTF Y2K

Paul Harden, NA5N
P.O. Box 757
Socorro, New Mexico 87801
NA5N@Rt66.com

The official contest rules for this year's **QRP To The Field (QRPTTF)** are on pages 55 and 56. There are a few major rule changes to note, as well as the new NorCal Contest Manager for which to address your questions and submit your logs.

Discussion.

For the past several years, NorCal has applied a *theme* to QRPTTF to encourage participation and foster some fun. And many QRPers have participated in QRPTTF together, combining it with camping trips and the like, doubling their fun by associating with other QRPers off-the-air as well as on-the-air.

For the past two years, the theme has been "Run to the Border" to encourage operating from a state line, and rewarding those who make this heroic effort with a larger multiplier. We believe this has been a successful theme, and from the soapbox comments received with last year's logs (and on QRP-L), most want to see this theme continue. However, others have pointed out the difficulty of the long distances in many cases in reaching the state line. Believe it or not, Californian's have complained about this the most, and rightfully so. It is a deceivingly big state, combined with the Sierra Mountain range running down the middle, for which few roads actually pass through them, making it a many-hundred mile line reaching the Nevada or Arizona border. Likewise, many QRPers on the east coast have found it difficult to operate near the state line due to private property ownership, in the middle of an interstate, etc. making such an operation hazzardous. Nor do I need mention the opinion of the state borders theme from our friends in Alaska and Hawaii -hi.

So in order to be fair and try to ensure as many people as possible can participate, we have decided to use bodies of water as this year's theme, and this year's field multipliers. This has several advantages. First, according to the 1990 Census, nearly 80% of the U.S. population lives within 100 miles of theocean, including the Gulf of Mexico and the Great Lakes. Granted, the 2000 Census might shift this number a bit! But evidently, most American's live near a major body of water. This should make it more convenient for many. Secondly, even for those land-locked QRPers, there is certainly a body water nearer to you than a state border. Remember, it's all in fun, and operating near a body of water is merely a means to reward those who make the effort to truly "go to the field."

One goal of QRPTTF is the added serendipitous effect of the contest. That is, scoring is often based more on luck than on skill. When you work a station in this year's QRPTTF, until you copy his exchange, you don't know whether that contact will be worth 5 points or 25. We feel this gives QRPers a more even playing field to compete with eachother inspite of what the other stations code speed or equipment may be. This means if your code speed is marginal at best and you're going to the field with your NC20 and the perverbial "wet noodle," you have the same change of earning a fairly large score as the guy working 35 wpm with his K-2 and portable TA-33 beam.

We want all to have fun, and QRPTTF has evolved over the years to try to offer most QRPers that opportunity to have that fun and compete with "the big boys."

We see QRPTTF as an "event" more than a contest, but regardless of your definition or plan of attack, we want you to enjoy it.

Ocean Stations (OC) will be those that operate from very near the ocean, such as from a beach, cove or overlook. How close must you be to the ocean, you ask? Just like for the state lines, as close as feasible without risking safety or ending up in the middle of a freeway or in someone's private property. We ask that you submit a photo of your operation when submitting a log. The photo must show your operation, along with the ocean, in the same field of view. And please identify the QRPers in the photo by name and call, in the event we use the photo in QRPp. For this you are rewarded with multiplying your final score by 4, plus the joy of handing out 20 points to everyone who works you. You can identify the ocean or beach you are operating from, if you wish, but strictly at your option. Please keep safety in mind at all times, and realize the ocean produces that nasty salt spray, so operate far enough way and take the precautions necessary to protect your equipment.

Maritime Mobile (MM) stations is the top-scoring bonus for QRPTTF. Keep in mind, this is intended for the seasoned seafarer's - those QRPers who have access to a boat or craft and have done this sort of thing before. I have received email in the past from several who like to operate from their crafts on the Great Lakes, Puget Sound, etc. Well, here's your chance to do it, and earn the maximum field location multiplier of 5, plus hand out 25 QSO points per contact. This category also requires a photo showing your operation with the ocean and/or your boat in the same field of view. Again, safety is of the utmost concern. If you've never operated maritime mobile before, don't go out and rent a deep sea fishing vessel and tackle the Straits of Juan de Fuca to "get your feet wet." Bad idea fellas.

The WT or Water category is for about everyone else who operates from an inland body of water, such as a lake, reservoir, dam, river, canal, etc. You do NOT need to submit a photo, but the guidelines would be the same ... operate close enough that your station and the body of water are in the same field of view. How large must the lake or river be, you ask? As a general guide, if it has a name, it's probably big enough. This category will probably be the majority of stations worked during QRPTTF.

Field Stations (FD) are those who go to the field and for whatever reason, just can't seem to find a nearby body of water.

Home Stations (HO) are those who operate from an established station in their home. In the past, the home stations have felt discriminated against. We realize not everyone has the means to participate in QRPTTF from the field. So this year, all home stations will be listed separately in the results, so they can compete in score with others in the same home category. We really want you to enjoy the fun, too!

Whether you operate from a lake, river, the Atlantic Ocean or Maritime Mobile, we hope you take along a couple of QRP friends and make a nice weekend of it and enjoy the fraternity unique to our hobby. Have fun in all respects. If you have any questions about your intended operation or what category it qualifies as, please feel free to contact me at *NA5N@Rt66.com*, or the Contest Manager at *jmedley@ix.netcom.com*

The Next NorCal Kit ... or Two

Doug Hendricks, KI6DS
ki6ds@hotmail.com

NorCal has been rather quiet lately since our last kit, the NorCal 20. This doesn't mean that new kit projects are not in development! Like all NorCal projects, the NC-20 was filled with success, from the continued reports of the fun they were to build to how they operated on the air (many calling it "a real radio"), to launching Red Hot Radio in order to meet the continuing demand, to seeing the NC-20's being delivered to hams overseas, mostly through the efforts of G-QRP. It was indeed a rewarding project.

I have always been proud of the NorCal team over the years. They have designed great projects and developed many innovations in kit building. Many of these innovations have been adopted by commercial kit vendors and other club kits. Board mounted controls, easy-access and attractive enclosures, built-in TiCK keyers, audio annunciators, easy-to-follow instruction manuals and minimal alignment steps, to name a few.

Now it's time to introduce the next step in design and innovation for QRP kits by our design team: **surface mount technology (SMT).**

Why Surface Mount?
SMT is taking over the electronics industry. Already certain types of thru-hole components are getting hard to get, especially in quantity for a kit build. It's not a crisis situation yet, but it soon will be, particularly with some of the IC's we have learned to depend on. Since QRPers are in the forefront of kit building, it is to our benefit to learn how to use surface mounted components now at our leisure, before we're forced into it.

NorCal has two SMT kits in development (described below). We are offering these kits for the following reasons:

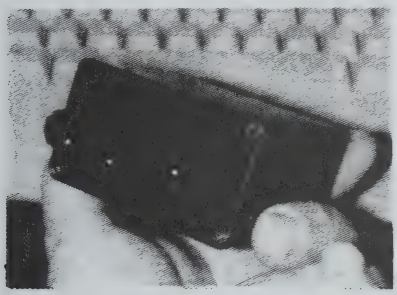
1. To keep up with the industry trends towards SMT. It's here to stay.
2. Gain the experience *now* in designing and building surface mount kits.
3. Develop the innovations necessary to make SMT construction by hobbyists easy and successful. This includes developing new ways to package a kit with many, tiny SMT components.
4. Many QRPers work in electronics for a living. And while many may not *yet* be using SMT, they will be required to in their jobs before long. An SMT kit will provide the experience necessary for both hobby and employment.
5. It is too costly for a commercial kit vendor to take the financial risk to develop an SMT kit. What we learn can be used by kit providers and clubs to develop their own SMT kits.

All in all, we think learning to work with SMT now, while we have the leisure of time, and not out of neccessity, will do nothing but help the hobby. If we do nothing now, then chronic shortages of parts will creep upon us, making homebrew projects and kits difficult to complete. This is learning experience we all need do overcome now. And we think once you build your first SMT kit, you will overcome the lack of confidence in working with SMT you may have now.

The TWO NorCal SMT Kits.

NorCal will be offering *two* SMT kits this year, which for now we'll call SMK-1 and SMK-2. SMK-1 will be ready to ship about the time you read this; SMK-2 is targetted for before PacifiCon in October.

The main kit offering will be the SMK-2. This will be a full-ledged transceiver. However, before tackling this kit, we felt it would be beneficial to offer an easier kit first, so we can all gain some experience.

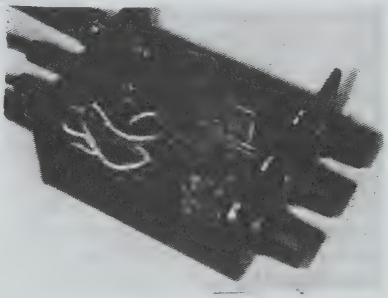


NorCal Announces Surface Mount Kit The SMK-1

The SMK-1 is the "training or beginner rig" before tackling the new full featured kit becomes available this fall.

The SMK-1 is basically the Tune Tin 2 and the MRX receiver with the mods shown on Dave Fifield's web page (www.redhotradio.com). Of course, we had to make some changes. First of all, the LM380 is not available in surface mount, so Dave switched it for an LM386. What Dave ended up with is a neat little surface mount project. It is a transceiver, with separate VXO tuning for transmit and receive. That means you have instant RIT and XIT! Plus, it uses diode switching and has a real side tone. The TT2 transmitter tunes about 1.5KHz and the receiver about 4-5 KHz. They do overlap so true transceiver operation is possible. No thump, no microphonics, just a slight chirp. We used the MRX receiver with a couple of mods and it works pretty good. Prototypes had an MDS of -117dBm, which is fine for 40M.

The exciting thing is the rig is all surface mount parts except for the 2 crystals (7.040 MHz), 2 trim caps and the 3 control pots. We use **1206 parts**, the "big ones." 1206 means they are .12 x .06 inches in size for the resistors and capacitors. There are 85 parts in the kit, a professional quality, double sided, solder masked, silkscreened board, and we supply all board mounted parts including the 3 control pots. You will need to come up with the audio jack, key jack, power jack and antenna jack of your choice. The 3 control pots are mounted across the front of the board, and are used to connect it to the front panel. The pads for the audio, key, power and antenna connectors are on 0.1" centers so you can use molex connectors if you wish (not supplied). We are not supplying a case, but out good friends at the NJQRP Club are offering a specially designed enclosure kit that comes with the connectors, knobs and feet. The information on the NJQRP case is on the next page. A photo of the prototype is shown below.



I've saved the best for last. The size of the board is 2.5" wide by 2.25" deep!

The cost? $30 + $4 shipping and handling. NorCal is taking orders now. Mail your check, made out to Jim Cates for $34 and requesting the SMK-2, and send to:

Jim Cates, WA6GER
3241 Eastwood Road
Sacramento, CA 95821

This is a very usable transceiver. It is not the NC-40 or NC-20, but better than the 49'er. The prototype puts out 360mW.

The SMK-1 is designed to introduce you to working with surface mount parts. It has over 70 SMT parts. We think the average builder will not have a problem with it. We did this to start training QRP homebrewer's in SM construction. We also wanted to do a simpler kit that would be very easy to build, provide training, easy to trouble-shot, and also give me experience in kitting before the full featured rig comes out. I have some unique ideas on how to package the parts so that they are easily identifiable yet reasonable to kit. This should be fun for all of us, learning together.

SMK-1 Enclosure Kit from the NJQRP

by George Heron, N2APB

SMK-1 in the NJQRP Enclosure Kit

The NJQRP club is pleased to offer another "first" for the QRP community: a homebrew enclosure kit made entirely from double-sided copper clad PCB material. Working closely with NorCal in the introduction of their SMK-1 transceiver, we designed an enclosure tailored to the small-sized SMK-1 and created a kit of all parts needed to finish off this surface mount transceiver.

Included in the SMK-1 Enclosure Kit:

- 8 precision-cut, pre-drilled copper clad boards which, when soldered together as instructed, form the enclosure shown above.
- 3 knobs (for the SMK-1 pots)
- 2 1/8" audio jacks (back panel)
- 2.1mm DC coaxial jack (back panel)
- Antenna BNC (back panel)
- 2 small screws to hold the top half of the case to the bottom
- 4 small screws and 2 nylon spacers for mounting SMK-1 in place
- 4 rubber feet
- Preprinted front and rear panel labels on clear acetate, suitable for gluing to enclosure for a professional, finished appearance.
- 10-page detailed instruction manual for finishing the SMK-1 with enclosure.

Availability: Will be ready to ship with the SMK-1 kits from NorCal early April.

Price and Ordering: The SMK-1 enclosure kit is $10 from the NJQRP Club. Send cash, check or money order payable to "George Heron, N2APB" to:

George Heron, N2APB
2419 Feather Mae Court
Forest Hill, Maryland 21050

Additional information and photos can be seen on the NJQRP website at:

www.njqrp.org/smk-1/

As of this writing, there has been seven prototype/beta-testers for both the NorCal SMK-1 kit, and the NJQRP enclosure kit.s. Everyone built them successfully, and all found getting the "knack" of working with surface mounted components was easier than they thought. Those first 2-3 resistors are a bear, but a snap after that!

The NorCal Surface Mount Transceiver
The "SMK-2"

by Doug Hendricks, KI6DS
ki6ds@hotmail.com

NorCal has been developing the next step in QRP kits -- a full fledged transceiver using surface mount parts. This kit, like the SMK-1, will use the larger 1206 sized components and use IC's that are the same size as the ones that Embedded Research uses for their surface mount TiCK Keyer.

What we are talking about is a full featured transceiver, very small in footprint, has a built in keyer, DDS VFO, and it will be offered on **10 meters** to begin with, with other bands added later. We will of course have some thru-hole parts that are necessary, but SMT will be used wherever possible.

The kit will be board and parts only, with you doing your own case. Who is the designer? Well, if we reveal that right now, the poor guy would be deluged with questions and wouldn't have time to finish the design. But rest assured that it is a very well known QRPer and an outstanding designer, professionally as well as for the hobby.

Target Date.
Our goal is to have the full-featured kit ready to release this fall, before PacifiCon. Hopefully in August or September. This will give us plenty of time to get the prototype boards done and built, parts in and packaged over the summer. Progress will be reported in QRPp and on QRP-L.

Target Price.
The SMK-2 kit is targetted for **$50.** This is for the full featured QRP transceiver with RIT, XIT, built-in keyer, DDS VFO, AFA and a commercial quality board. Can we do it? Yes, I think so. The DDS VFO chip will be premounted, as it does come in a package not feasible for the average guy to mount. But the rest of the chips, caps, inductors, trimcaps, trimpots, resistors, transistors, diodes, all will be surface mount where possible.

Rig Name.
We are calling it the "SMK-2" for the purposes of this article and initial announcement only. We'll no doubt come up with a far better name in the future! Maybe a good name will evolve out of those building the SMK-1 first.

Some challenges ahead.
We have several new problems to solve that are very unique to kitting a surface mount kit. They include how to package the kit, how to identify the parts, how to do the manual (remember, this will be the first time for many of the builders working with surface mount). We have some unique ideas, things that have never been done before with a kit. I am excited about trying these new ideas, and some of the concepts that the NorCal Surface Mount Team is working on now.

Why are we doing this?
Because, thru-hole parts are going away. For us to be on the cutting edge, to do new things, we will have to bite the bullet and use surface mount components in the near future. So why not do it now and be ahead of the game before shortages in thru-hole parts bite us? Look at it as a new skill to learn, not as something that you "can't do."

Orders ONLY for the SMK-1 are being accepted at this time;NOT for the SMK-2 full featured kit. When ready, it will be announced on QRP-L and in QRPp.

Surface Mount Kit(s) Summary

The SMK-2 is the full featured QRP transceiver. It will be released in the Autumn before PacifiCon. Orders for this SMT kit *are not being accepted at this time.*

The NorCal SMK-1 Kit is the TT2/MRX "training" kit. It will be ready to ship about the time you receive this issue of QRPp. *Orders are being accepted at this time.*

Send $34 ($30 + $4 shipping/handling) to:

Jim Cates, WA6GER
3241 Eastwood Road
Sacramento, CA 95821

Make check/MOs payable to Jim Cates.

The NJQRP Enclosure Kit is for the enclosure, knobs, etc. for the NorCal SMK-1. Order the enclosure kit from the **NJQRP Club**, *Not NorCal.*

Send $10 (shipping included) to:

George Heron, N2APB
2419 Feather Mae Court
Forest Hill, Maryland 21050

Make check/MO payable to George Heron.

NorCal Worked All States (WAS) Record

STATE	CODE	STATION	QSL	NOTES
Alabama	AL			
Alaska	AK			
Arizona	AZ			
Arkansas	AR			
California	CA			
Colorado	CO			
Connecticut	CT			
Delaware	DE			
Florida	FL			
Georgia	GA			
Hawaii	HI			
Idaho	ID			
Illinois	IL			
Indiana	IN			
Iowa	IA			
Kansas	KS			
Kentucky	KY			
Louisiana	LA			
Maryland	MD			
Maine	ME			
Massacheusetts	MA			
Michigan	MI			
Minnesota	MN			
Mississippi	MS			
Missouri	MO			
Montana	MT			
Nebraska	NE			

STATE	CODE	STATION	QSL	NOTES
Nevada	NV			
New Hampshire	NH			
New Jersey	NJ			
New Mexico	NM			
New York	NY			
North Carolina	NC			
North Dakota	ND			
Ohio	OH			
Oklahoma	OK			
Oregon	OR			
Pennsylvania	PA			
Rhode Island	RI			
South Carolina	SC			
South Dakota	SD			
Tennessee	TN			
Texas	TX			
Utah	UT			
Vermont	VT			
Virginia	VA			
Washington	WA			
West Virginia	WV			
Wisconsin	WI			

Q-Signals are an amendment to the International Radiotelegraph Convention (IRC) adopted during WW-I, intended for commercial telegraphy stations. Today's Q-signals are about a third of the original list, and still used by the military, maritime stations, and of course the radio amateur. Q-signals can be a question, an answer or a statement.

Example: **QRL?**.... "Are you busy?" or "Is this frequency in use?"
QRL .... "I am busy" or "This frequency is in use."

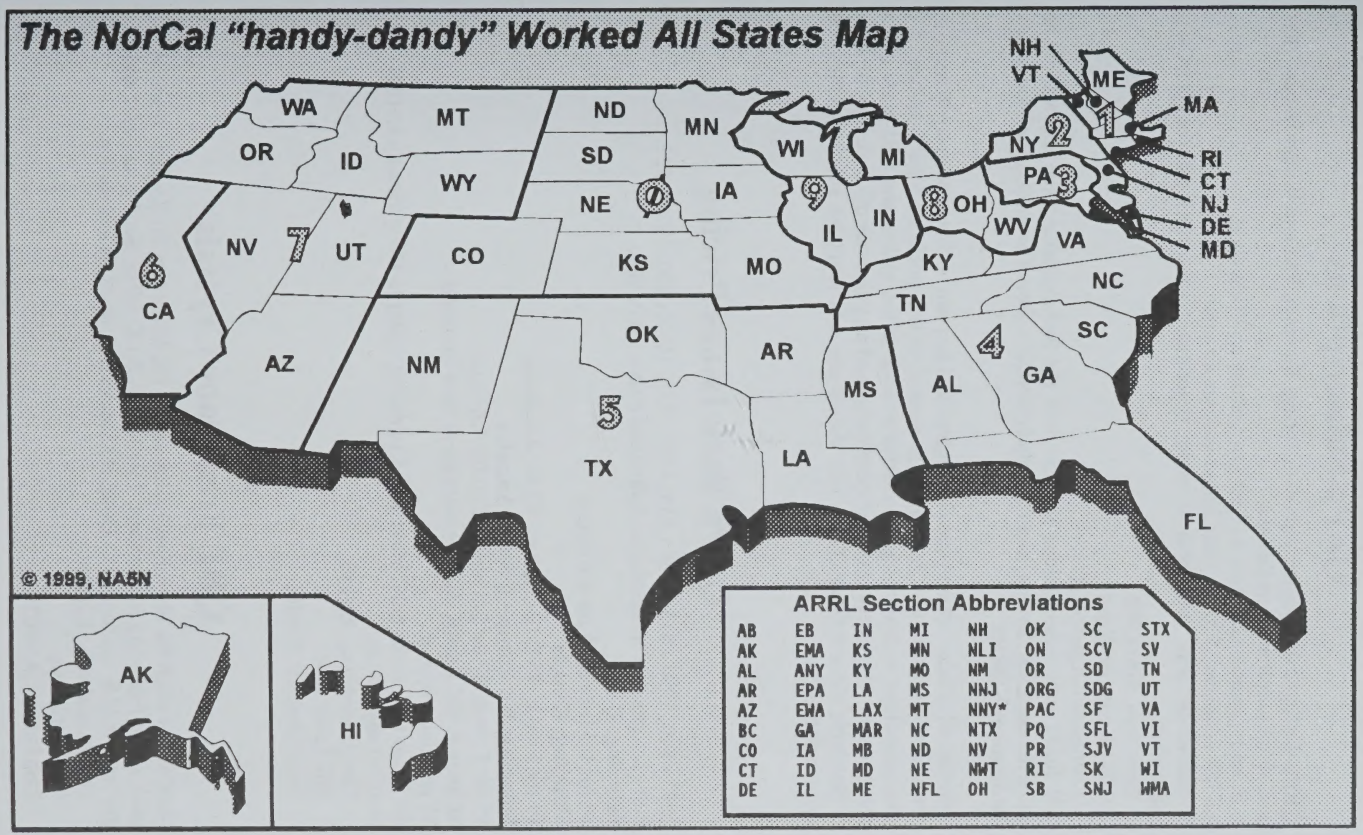
Q-Signals

†**QRA**	What is the name of your station?
†**QRG**	What is my exact frequency?
QRK	What is my signal intelligibility?
†**QRL**	Are you busy?
†**QRM**	Am I being interfered with? (**M**an-made interference)
†**QRN**	Am I being interfered with? (**N**atural interference)
†**QRO**	Shall I increase transmitter power?
†**QRP**	Shall I decrease transmitter power?
†**QRQ**	Shall I send faster?
†**QRS**	Shall I send slower?
†**QRT**	Shall I stop sending?
†**QRU**	Have you anything for me? (more to say, traffic, etc.)
†**QRV**	Are you ready?
QRX	When will you call again?
†**QRZ**	What station is calling me?
†**QSA**	What is my signal strength? (S1 to S5)
†**QSB**	Are my signals fading?
†**QSK**	Can you operate break-in?
†**QSL**	Can you acknowledge receipt?
†**QSO**	Can you communicate with ___ direct?
QSP	Can you relay to ___?
QST	ARRL special Q-signal, "Calling all radio amateurs."
QSV	Shall I send a series of V's?
QSW	Will you transmit on ___? (Frequency or time)
QSX	Will you listen for (station) on ___ KHz?
†**QSY**	Shall I change my frequency?
†**QTH**	What is your location?
QTR	What is your local time?
QTV	Shall I stand guard for you? (or assume net control?)
QTX	Will you keep your station open for further QSO's?

† Q-signals most commonly used on the ham bands.

Some "generic" meanings of Q-Signals (and/or in contest work)

QRP A category of hams using low-power equipment. Legally, QRP is 5W or less. QRP often implies small, homebuilt and/or battery powered transceivers.
QRZ In a contest or pile-up, used to mean "who is next to work me?"
QSL A card sent between stations to verify 2-way contact. Also used to ask if your last communications was received. **Ex.** *UR RST 57N NR138 QSL?*
QRX Sometimes used to mean "Please standby." **Ex.** *HV PHONE CALL PSE QRX*
QRT Going off the air; closing my station. **Ex.** *NEED TO QRT NW7 3 OM*


The NorCal "handy-dandy" Worked All States Map
NH
VT
ME
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DE
MD
WA
OR
CA
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NV
MT
WY
UT
AZ
CO
NM
ND
SD
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AK
HI
ARRL Section Abbreviations
AB EB IN MI NH OK SC STX
AK EMA KS MN NLI ON SCV SV
AL ANY KY MO NM OR SD TN
AR EPA LA MS NNJ ORG SDG UT
AZ EWA LAX MT NNY* PAC SF VA
BC GA MAR NC NTX PQ SFL VI
CO IA MB ND NV PR SJV VT
CT ID MD NE NWT RI SK WI
DE IL ME NFL OH SB SNJ WMA

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Jim Cates, WA6GER
3241 Eastwood Road
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$5 per issue ordered.
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Doug Hendricks, KI6DS
862 Frank Ave.
Dos Palos, CA 93620

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NorCal has available the following crystals in HC49U cases for $3 each, postage paid, in the following frequencies: 7.040 MHz, 7.122 MHz. Send your order and payment in U.S. funds only to Doug Hendricks (not NorCal) and mail to:

Doug Hendricks, KI6DS
862 Frank Ave.
Dos Palos, CA 93620

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Dos Palos, CA 93620

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